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ABSTRACT

The problem of this study was to determine whether Method A is a more efficient observational method for obtaining activity type behaviors in an individualized classroom than Method B. Method A requires the observer to record the activities of the entire class at given intervals while Method B requires only the activities of selected individuals to be recorded. The overall plan consisted of collecting a cumulative every 30-second 20-day cumulative criterion to which each method was compared to determine which of the two was more efficient. It was found that the minimum number of observer hours required to reach an acceptable level was less for Method B than Method A. Therefore, it was concluded that Method B is a more efficient observational method for obtaining activity type observations in an individualized classroom than Method A. (Author)

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A COMPARATIVE INVESTIGATION OF THE EFFICIENCY OF TWO CLASSROOM OBSERVATIONAL METHODS

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1970

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CHAPTER I

INTRODUCTION AND REVIEW OF RELATED RESEARCH

In order to accommodate the unique learning characteristics of the pupil, various instructional programs have been developed and have been implemented in classroom practice. Of particular interest has been the development of individualized instructional systems that are responsive to the needs of the individual pupil. It is the intent of these programs to maximize the pupil's opportunity to engage in selected learning experiences that are planned for his particular needs as he progresses through a proposed curriculum. These programs differ in terms of the procedures followed and the materials and equipment employed. Hence, the specific characteristics and objectives of a particular system should be reflected in the overt behavior of the pupils. Through a systematic analysis of pupil behavior, strengths and weaknesses of the actual operation of an instructional program can often be revealed relative to the stated specific goals of the program. For this reason, a systematic and objective analysis of pupil classroom activities can be a valuable aid for monitoring existing programs and evaluating the effectiveness of the programs. However, careful consideration must be given to the accuracy and consistency of the observational method employed in observing these behaviors.

The development of efficient methods for observing pupil classroom behavior has been of concern to educators and a number of

procedures have been defined. In general, then observational methods can be classified as direct or indirect.

Direct versus Indirect Observation

Direct

Studies employing the direct observational method require an observer to be present in the classroom to classify or rate verbal or non-verbal behaviors directly onto an observational form or to record behaviors in the form of a code to be transcribed later. Sears terms this method of obtaining observational data a "naturalistic settings"[1] situation. Perkins[2] satisfactorily used the "naturalistic settings" situation or the direct method to determine differences between pre-identified underachievers and achieving fifth graders by recording various aspects of pupil activity type behavior, pupil verbal behavior, and teacher verbal behavior presumed to be related to achievement.

Although utilizing the direct method allows the observer to become a more integral part of the classroom, thereby facilitating the interpretation of the subtle changes occurring in the classroom and possibly increasing significantly the accuracy of the recorded behavior, it can be argued that an observer's presence in the classroom may cause the teacher and pupils to change their behavior. However, Heyns and Lippitt stated that it ". . . is the common feeling among experienced users of observers that the observers have very little effect,

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[1]Pauline S. Sears, "Problems in the Investigation of Achievement and Self-Esteem Motivation," in Nebraska Symposium on Motivation, ed. by M. R. Jones (Lincoln: University Press, 1957), p. 266.

[2]Hugh V. Perkins, "A Procedure for Assessing the Classroom Behavior of Students and Teachers," American Educational Research Journal, I (November, 1964), pp. 249-260.

if any. The belief is shared by experimenters who have worked in a wide variety of situations and with many different kinds of subjects."[1]

A further point of view concerning direct observational procedures is that stated by Medley and Mitzel who contend that:

> If an investigator visits a group of classrooms, he can be sure that; regardless of his presence, he will see teachers teaching and pupils learning; he will see better and poorer teachers, effective and ineffective methods, skillful and unskillful use of theory. If he does not see these things, and measure them, it will not be because these things are not there to see, record, and measure. It will be because he does not know what to look for, how to record it, or how to score the records; in short, he does not know how to measure behavior by systematic observation.[2]

Therefore, for an observational study to have meaning, the classification system must be designed to yield data related to the problem being investigated and the observers must be appropriately trained to systematically classify and record behaviors according to the system.

The direct method of collecting systematic data can be advantageously employed for many purposes. For example, it can be used to train student teachers in the skills of effective teaching or it can be used as a feedback instrument to teachers for self-improvement. It has also been effectively employed to measure behavior according to pre-determined psychological concepts.

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[1] Roger W. Heyns and Ronald Lippitt, "Systematic Observational Techniques," in Handbook of Social Psychology, Vol. I, ed. by G. Lindzey (Cambridge, Mass.: Addison-Wesley, 1954), p. 399.

[2] Donald M. Medley and Harold E. Mitzel, "Measuring Classroom Behavior by Systematic Observation," in Handbook of Research on Teaching, American Educational Research Association, ed. by N. L. Gage (Chicago: Rand McNally and Co., 1963), p. 248.

The Flanders[1] system, which categorizes classroom verbal interaction according to direct or indirect teacher influence, has been utilized for this purpose. Brunner[2] reported using a modification of the Flanders system to improve in-service and pre-service teacher training. Within five to ten minutes the procedure provided feedback to the college supervisor for discussion with the student teacher or to the teacher for self-analysis.

A further advantage to the direct method is that no special equipment is required, such as a kinescope which was used in Medley's[3] indirect student teacher behavior studies. Since no special equipment need be installed or transported, the mobility of the observer from classroom to classroom or from school to school is not hindered. Moreover, direct methods not only give the observer freedom of movement which increases observer efficiency but also the materials cost is low. Therefore, the expense of carrying out an observational study is minimum.

Although direct methods usually require only one observer to obtain observational data, it must be recognized that one of the disadvantages to the direct method is that there is no way of checking

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[1] Ned A. Flanders, "Interaction Analysis in the Classroom: A Manual for Observers," in Mirrors for Behavior: An Anthology of Classroom Observation Instruments, Vol. II (5) ed. by Anita Simon and E. Gil Boyer (Philadelphia, Penn.: Research for Better Schools, 1967), pp. 1-51.

[2] Ellen Brunner, "PIC-Profile of Interaction in the Classroom: A Quick Feedback of Interaction Analysis" (paper presented at the AERA Convention, Minneapolis, Minn., March 5, 1970), pp. 1-4.

[3] Donald M. Medley, "Experiences with the OScAR Technique," Journal of Teacher Education, XIV (September, 1963), pp. 270-273.

observer classification except by placing other observers in the classroom at the same time, as did Cornell, Lindvall, and Saupe.[1]

Even though the direct method has some limitations, it is apparent that the direct method is a feasible way of obtaining systematic observational data in an individualized classroom.

Indirect

The indirect method is the second general method for obtaining systematic classroom observations. Permanent recordings of classroom behavior are preserved either through handwritten manuscripts or with the aid of a mechanical process and then the classification of behaviors is carried out at a later time. For example, the indirect method permits verbal behaviors to be analyzed into categories from stenotype or audio-tape recordings and overt behaviors to be permanently recorded through movies or videotape recordings. Studies measuring the cognitive dimension through verbal interaction analysis usually employ the indirect method of observation. However, the indirect method can also be utilized to permanently record the activity type behaviors of individuals or small groups so that activities can be examined in detail and measured according to specific concepts being investigated.

Two advantages to obtaining permanent records of behavior are that records can be examined as often as necessary and observer reliability and agreement can be easily checked. Another is the

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[1] F. G. Cornell, C. M. Lindvall, and J. L. Saupe, An Exploratory Measurement of Individualities of Schools and Classrooms, (Urbana, Illinois: Bureau of Educational Research, University of Illinois, 1952), p. 37.

convenience of using the records in developing new instruments of measurement and categories of behavior which are related to the specific hypotheses being investigated. Withall[1] made use of tape recordings to study verbal interaction data in order to design an observation instrument and to test selected hypotheses related to verbal behavior. He used the recordings to develop a seven category system for measuring the social-emotional climate of the classroom. By listening to classroom statements made by teachers, a classification method was devised for analyzing the verbal pattern of teacher behavior. Withall concluded that it was possible to develop a valid measure of social climate through the categorization of teacher statements.

The indirect method has advantages but there are certain disadvantages that must be considered. If an observer is not in the classroom, he may misinterpret the mood and intention of behaviors. Also, the degree of deviation from natural classroom behavior to artificial behavior due to the psychological effect of having one's exact words and actions recorded or filmed has not been explored. This may be a more serious problem when using the indirect method than when using the direct method if the individuals are aware that their behavior is being observed. However, there are circumstances when the indirect method would be better. For example, an audio-tape recorder concealed in the classroom would have no effect on teacher-pupil interaction. Therefore, if it was not necessary to identify individual pupils, the indirect method of observation may be better than the direct.

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[1] John Withall, "The Development of a Technique for the Measurement of Social-Emotional Climate in Classrooms," Journal of Experimental Education, XVII (March, 1949), pp. 347-361.

A further disadvantage is the high cost of installing and using mechanical equipment. It could limit the number of classrooms and schools sampled for observational studies. It might even tend to limit the sampling in a single classroom during a class period because of technical considerations. If a large class is engaged in independent study, the number of students who can be filmed during a given time interval is restricted. In contrast Lindvall, Yeager, Wang, and Wood[1] reported that utilizing their schedule and a method of direct observation, it was possible to account for the activities of an entire class at least every few minutes.

In summary, it can be stated that although the indirect method has desirable features to recommend its use in classroom observational studies, and it is better for certain types of overt and verbal interaction studies than the direct method, there are several qualities lacking which would restrict its general use in school districts. Limited sampling, the cost of operation, the availability of equipment, and in many cases the need of a skilled equipment operator are the main detractors for utilizing the indirect method. Therefore, the direct method of collecting observational data was employed in this study.

Characteristics of Direct Observation

One of the major characteristics of direct observational methods is that behaviors are recorded or rated directly in the classroom by at

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[1]C. M. Lindvall, John L. Yeager, Margaret Wang, and Carolyn Wood, "Manual for IPI Student Observation Form," in Mirrors for Behavior: An Anthology of Classroom Observation Instruments, Vol. III (12), ed. by Anita Simon and E. Gil Boyer (Philadelphia, Penn.: Research for Better Schools, 1967), pp. 1-3.

least one observer. Usually the observer follows some systematic classification system to record verbal and activity type or overt behaviors.

The specific characteristics of each system of observation are determined by the purpose and assumptions of the research. Characteristics of various systems can best be reviewed by examining a number of specific studies and the instruments used.

Recently Spaulding[1] reported the development of a method for coding the overt behaviors of pupils in the classroom. This method was designed to obtain case studies of the activities of pupils in order to determine their management of classroom time. Each behavior was to be classified into one of thirteen categories. The categories of the instrument were based on the psychological concepts of integrative and dominative social behavior, and the grouping of passive behaviors were at one end and aggressive behaviors at the other end. Because Spaulding's procedure was specifically designed for case studies, it might be easily adapted for use in an individualized classroom. One difficulty, however, in using this instrument is that the observer training period is from two to three weeks in length.

Another study of classroom activities was that of Cornell, Lindvall, and Saupe[2] which discussed the systematic observational data obtained on organizational procedures and the social-emotional climate

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[1] Robert L. Spaulding, An Introduction to the Use of Coping Analysis Schedule for Educational Settings (CASES) and the Spaulding Teacher Activity Rating Schedule (STARS), (Durham, North Carolina: Duke University, Education Improvement Program, 1967), pp. 1-18.

[2] Cornell, Lindvall, and Saupe, An Exploratory Measurement, pp. 1-71.

of a variety of classrooms in different school systems. Various types of behaviors were classified onto a schedule organized in the following manner: (1) differentiation--work difference, (2) social organization--teacher-pupil organization, (3) pupil initiative--teacher or pupil control, (4) content--material used, (5) variety--activities taking place, (6) competency--teacher, (7) climate--teacher, and (8) climate--pupil. Extensive information was collected on each of these dimensions, and it was concluded that it was possible to measure differences between classrooms through direct systematic behavior classification of classroom activities. Another detailed study concerning pupil activities was undertaken by Medley and Mitzel.[1] The method employed a schedule developed by the authors which was called "the OScAR". This schedule was divided into the following sections: (1) activity, (2) grouping, (3) sign, (4) material, (5) expressive behavior, and (6) subject. As pointed out by Medley and Mitzel, one of the desirable features of the OScAR is that no interpretation of behavior by the observer beyond rather obvious classification is necessary. Therefore, highly trained observers were not necessary. Both the Cornell, Lindvall, and Saupe schedule and the OScAR were devised to measure the social and emotional dimensions of the classroom and to record the diversity of activities in which the teacher and pupils engage.

Kowatrakul[2] introduced another system that was designed to measure individual behaviors in the classroom. The observation

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[1]Donald M. Medley and Harold E. Mitzel, "A Technique for Measuring Classroom Behavior," Journal of Educational Psychology, XLIX (April, 1958), pp. 86-92.

[2]Surang Kowatrakul, "Some Behaviors of Elementary School Children Related to Classroom Activities and Subject Areas," Journal of Educational Psychology, L (July, 1959), pp. 121-128.

schedule was divided into the categories of: (1) intent on ongoing work, (2) social work, (3) social-friendly, (4) momentary withdrawal, (5) intent on work in another academic area, and (6) intent on work in non-academic area. By recording observational data while students were engaged in independent seat work, watching-listening and discussion, Kowatrakul was able to study the effect of the nature of classroom activity on the behavior of individual pupils. Perkins[1] reported that he expanded Kowatrakul's six categories to nine for a part of his study of achieving and underachieving elementary school students.

To determine the difference between control and activity type schools, Thorndike, Lotus and Goldman[2] employed a method which involved systematically observing five students from each of thirty-two schools. The categories were derived from direct descriptive data and were mainly concerned with measuring the social dimension. They are listed as follows: (1) contribution to recitation or discussion, (2) working as an individual--assigned work, (3) teacher originated activity but not directed, (4) self-originated activity, (5) observes or passively attends, (6) cooperates with class routine, (7) gives or receives cooperation, (8) communicates with another pupil, (9) inactive or unattentive, (10) fidgets, (11) displays feeling, (12) disciplines or is disciplined, and (13) commends or is commended. When these categories were checked directly in the classrooms of activity and control type schools, the results indicated

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[1] Perkins, "Assessing Classroom Behaviors," pp. 250-251.

[2] Robert L. Thorndike, John L. Loftus, and Bernard Goldman, "Observations of the Behavior of Children in Activity and Control Schools," Journal of Experimental Education, X (December, 1941), pp. 138-145.

that there were more similarities than differences between the behaviors recorded for the two types.

A schedule has been developed by Lindvall, Yeager, Wang, and Wood[1] to measure the activities of an entire individualized classroom or an individual who is part of the class. All classroom activity is recorded at designated time intervals into one of the following categories: (1) independent work, (2) teacher-pupil activity, (3) non-instructional activity, (4) pupil-pupil activity, and (5) group activity. Considering the previously discussed classroom dimensions, this instrument can be characterized as measuring the social dimension since no behavioral recordings pertaining to the emotional climate are made, i.e., teacher reinforcements, classroom moods, etc. One highly desirable feature of the schedule is that an extensive training period is not required for observers because the listed activities are easily recognizable and do not require extensive interpretation.

Technical Aspects of Activity Type Observations

As has been previously stated, one of the objectives of this research was to obtain a reliable method for observing individualized classes; therefore, reliability was one of the critical factors which determined the selected method recommended as a result of this study. Various segments of an observational procedure must be examined, so that the total resulting method is a reliable one and not biased by some overlooked inadequacy. The following discussion will review reliability, sampling, and the selection of time units. Careful

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[1] Lindvall, Yeager, Wang and Wood, "Manual for IPI Student Observation Form," pp. 1-3.

consideration of each of these aspects is essential to obtaining an efficient observational method.

Reliability

One type of reliability which has been of concern to several researchers, has been the reliability of the observer in recording activities. In order to control this element, Cornell, Lindvall, and Saupe[1] placed two observers in the classroom at the same time, each recording data independent of the other. This ability of two observers to agree on the same category has been termed category reliability by Moustakas, Sigel, and Schalock[2] and the proportion of agreements to the total sum of agreements and disagreements has been called observer reliability. As Medley and Mitzel[3] stressed, these factors are controlled to a large extent by the objectivity of the system, for as the subjectivity of coding increases, observer agreement of coding behaviors decreases. Withall[4] determined the objectivity of his instrument by comparing his classification of verbal teacher statements to the number of identical statements placed in the same category by

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[1]Cornell, Lindvall, and Saupe, An Exploratory Measurement, p. 37.

[2]Clark E. Moustakas, Irving E. Sigel, and Henry D. Schalock, "An Objective Method for the Measurement and Analysis of Child-Adult Interaction," Child Development, XXVII (June, 1956), pp. 127-131.

[3]Medley and Mitzel, "Measuring Classroom Behavior," pp. 254, 276.

[4]Withall, "Measurement of Social-Emotional Climate," p. 350.

four trained judges. In studying the logic of thinking, Smith, et. al.[1] determined the coefficient of interjudge agreement in order to investigate the reliability of the criteria which they had developed for classifying classroom discourse entries. As they pointed out, the low agreement obtained for some of the categories could have been due to several factors, among them the overlapping of categories and the demand of high inference on the part of the observer. As the system becomes more complex and abstract, the training period for observers must become longer in order to increase observer reliability.

One method of computing observer agreement for nominal data has been formulated by Scott.[2] The procedure produces an index of agreement. Scott[3] reported coefficients of agreement between two coders, who categorized interview statements according to moral ideals, and the stability indices of the subjects over time. An advantage to Scott's procedure is that one index of coder agreement is yielded for any number of categories. Therefore, it is more comprehensible for a series of categories than trying to compare individual percentages for each category. Flanders[4] employed Scott coefficients of agreement to determine the progress of observers during a training period. A Scott coefficient

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[1]Othanel B. Smith, et. al., A Study of the Logic of Teaching, U. S. Department of Health, Education, and Welfare, Office of Education, Cooperative Research Project No. 258-(7257), (Urbana, Illinois: Bureau of Educational Research, University of Illinois, 1962), pp. 43-45.

[2]William A. Scott, "Reliability of Content Analysis: The Case of Nominal Scale Coding," The Public Opinion Quarterly, XIX (Fall, 1955), pp. 321-325.

[3]William A. Scott, "Empirical Assessment of Values and Idealogies," American Sociological Review, XXIV (June, 1959), p. 303.

[4]Flanders, "Interaction Analysis in the Classroom," pp. 13-17.

of .85 or higher was assumed to be an acceptable level of performance. Additional advantages enumerated by Flanders for utilizing the Scott coefficient were that it ". . . is unaffected by low frequencies, can be adapted to percent figures, can be estimated more rapidly in the field and is more sensitive at higher levels of reliability."[1]

Another type of reliability which has been of interest to investigators is the reliability of observations made on different occasions by different observers in the same classrooms. If the instrument is reliable, it will discriminate between the performance of individuals or groups. Medley and Mitzel[2] have stressed that even though the coefficient of observer agreement may be high for the classification of certain behaviors in categories, the reliability of the instrument for differentiating between groups may be low. They have demonstrated this with the Cornell[3] data. For example, the coefficient of observer agreement for the social organization dimension was .66 while the reliability coefficient was only .35 for this dimension. An even greater difference was noted for the pupil initiative dimension with .43 for observer agreement and .00 for the reliability coefficient. As a part of his study of teacher-classroom variables facilitating pupil creative growth, Denny[4] employed an eleven dimension instrument designed to measure teacher promotion of pupil creativity. Three visits by a team of three observers were made to each

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[1] Flanders, "Interaction Analysis in the Classroom," p. 13.

[2] Donald M. Medley and Harold E. Mitzel, "Application of Analysis of Variance to the Estimation of the Reliability of Observations of Teachers' Classroom Behavior," Journal of Experimental Education, XXVII (September, 1958), pp. 23-35.

[3] Cornell, Lindvall, Saupe, An Exploratory Measurement, p. 37.

[4] David A. Denny, "Identification of Teacher-Classroom Variables Facilitating Pupil Creative Growth," American Educational Research Journal, V (May, 1968), pp. 365-381.

of thirty classrooms. A reliability coefficient of .42 was reported for the total observation schedule. Further investigation of his data illustrated that although the discriminating power of several of the dimensions was high, there were a few dimensions with low reliabilities and one with a zero reliability. Therefore, even though the dimensions provided information, the total discriminating power of the observation schedule was reduced. As mentioned previously, another phase to be considered in judging the reliability of the instrument is the mutual exclusiveness of the categories. If the categories overlap, the category discriminating power will be low and in turn will lower the reliability of the instrument. Kowatrakul[1] reported that the Spearman-Brown reliabilities of the scores for each of the six mutually exclusive activity type categories he employed were generally high. In this case the percentage scores for odd-number time samples were correlated with the even-number time samples to obtain reliabilities.

From the previous review of reliability, it can be concluded that in order to assure agreement on the operational definition of behaviors which will lead to uniform classification, adequate preliminary training must be given to observers and the categories of the observation form should be as exclusive and objective as possible. Also, in order for an instrument to have high discriminating power between groups, it must have a high reliability coefficient. All of these factors were important to this research and were considered in the final selection of the instrument and the design of the study.

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[1] Kowatrakul, "Behaviors of Elementary School Children," p. 123.

Sampling

The sampling of behavior is another aspect which must be examined in the designing of an observational method. Adequate behavior sampling is necessary to obtain reliable research results. This was apparent when the data reported by Denny[1] were investigated. For example, the dimension measuring "teacher approach" had a reliability coefficient for one visit of .41 while the reliability coefficient for the mean of three visits was .86. Although Denny reported that three random visits were made to each of thirty classrooms and the reliability data were obtained for one visit and for three visits, he gave no indication as to why a three visit sampling was chosen. However, as the results were summarized, he pointed out that the data emphasized the importance of making numerous visits because the items measured different types of behavior which were not readily observable in every situation. It is evident as the literature is reviewed, that the general practice has been to take samples of behavior with no explanation as to why a particular sampling size was chosen. Withall's[2] and Wright-Proctor's[3] studies are two studies that did provide some empirical evidence concerning the nature of the sampling procedure that should be utilized. Withall's investigation of learner-centered versus student-centered differentiation of teachers

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[1] Denny, "Identification of Teacher-Classroom Variables," pp. 366-381.

[2] Withall, "Measurement of Social-Emotional Climate," pp. 350-351.

[3] Muriel J. Wright and Virginia H. Proctor, Systematic Observations of Verbal Interaction as a Method of Comparing Mathematics Lessons, U. S. Department of Health, Education, and Welfare, Office of Education, Cooperative Research Project No. 816 (St. Louis: Washington University, 1961), pp. 77-81.

was based on a sampling of 200 verbal statements from each teacher. He ascertained this sample size by analyzing an unbiased random sample of verbal statements from one teacher. Successive blocks of fifty statements were added to each other until there was no fluctuation in the pattern of statements falling into the seven categories employed. The Wright-Proctor research recommended a ten-day observation period to provide a representative sample of verbal behavior classification in secondary mathematics classes. Sample size was determined by computing a ratio between the cumulative score for each frame of reference and the cumulative score for all reference scores as each day's statistics were added. From the previously reviewed reports, it can be concluded that adequate sampling size results in more reliable observational data. Hence, a main concern should be to ascertain through the analysis of the observational data, an adequate sampling size for individualized classrooms.

Time Interval

When the term "unit" is employed in observational studies, it usually refers either to the smallest time period during which behaviors are to be observed or to the most characteristic behavior identified by the investigator. Needless to say, if the units as defined are not strictly adhered to by the observer, the reliability of the research will be suspect, for these units become the base upon which the analysis of observational data is carried out. All interaction analysis category methods require this distinction for the proper classification of verbal behavior. Bales defined a unit of behavior for his system as, ". . . the smallest discriminable segment of verbal or non-verbal behavior to which the observer, using the present set of categories after proper training, can assign a classification under conditions of

continuous scoring,"[1] Flanders[2] categorized verbal behavior within a three-second time unit or when a behavior change occurred. For the purpose of exploring the cognitive dimension, interaction analysis may require that a unit extend to a series of behaviors. For example, rather than use item units, Taba[3] coded thought units and defined each as a remark, or a series of remarks which expressed a more or less complete idea. In examining the social and emotional dimension, Cornell, Lindvall, and Saupe[4] worked with a time unit, as did Medley and Mitzel.[5] Kowatrakul[6] and also Perkins[7] employed a point time sampling technique, whereby each subject was observed long enough to record a behavior. As has been previously mentioned, the more objective and systematic the unit of behavior recorded, the more reliable the research.

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[1]Robert F. Bales, Interaction Process Analysis (Cambridge, Mass.: Addison-Wesley, 1951), p. 50.

[2]Flanders, "Interaction Analysis in the Classroom," p. 3.

[3]Hilda Taba, et. al., Thinking in Elementary School Children, U. S. Department of Health, Education, and Welfare, Office of Education, Cooperative Research Project No. 1574, (San Francisco: San Francisco State College, 1967), p. 1.

[4]Cornell, Lindvall, and Saupe, An Exploratory Measurement, pp. 53-54.

[5]Medley and Mitzel, "A Technique for Measuring Classroom Behavior," p. 87-88.

[6]Kowatrakul, "Behaviors of Elementary School Children," p. 122.

[7]Perkins, "Assessing Classroom Behavior," p. 250.

Summary

Direct observational methods require the observer to classify behaviors directly in the classroom while indirect methods permit later classification. Usually indirect methods employ some type of mechanical device to permanently record behaviors. The advantage is that the films or tapes can be examined as often as necessary. However, there are several disadvantages to the indirect method. Among them are the high cost of equipment, restricted observer mobility, and limited sampling. The direct method requires no special equipment, thereby reducing the cost, and can provide the additional advantages of relatively quick feedback to the teacher or researcher, of unrestricted sampling, and observer mobility.

Either verbal or non-verbal behaviors can be studied through the direct method of classroom observation; the purpose of the research will determine the nature of the classification utilized.

The technical aspects of reliability, sampling, and the observational unit have been examined and the following general conclusions drawn:

(1) Observers must be adequately trained to understand the theoretical conceptualization of the classification system to assure observer agreement while classifying behaviors.

(2) The categories of the system should be as exclusive and objective as possible.

(3) Adequate samples must be chosen to obtain reliable observational results.

(4) The unit of behavior utilized should be such that it can be employed systematically and objectively.

CHAPTER II

THE PROBLEM AND HYPOTHESES

The purpose of this research was to examine the relative efficiency of selected methods for observing pupils in an individualized instructional setting. Over a given time period, the activity type behaviors in which pupils engaged were systematically recorded at given time intervals.

Statement of the Problem

The question investigated through this research was: Is an observational method which obtains observational data on an entire class more efficient over time than a method which obtains measurements on a sampling of pupils?

The general approach to the problem was to first determine the most efficient time sampling measures of each method by comparing the degrees of agreement between the various time samplings of each method and a criterion. Then a further comparison was made between the most efficient measures of each method to reveal the more efficient method of the two for collecting classroom observational data.

Data were obtained for this research by observing a single class for twenty periods. Before the research data were collected, the observers underwent an eleven-day training period. During the investigation, six observers were simultaneously utilized each day in the same

classroom. Two of the six observers were randomly assigned to collect data for Method A by obtaining activity measurements on the entire class every two minutes for thirty minutes, while the other four observers collected data for Method B and the criterion by recording observations on eight or nine pupils every thirty seconds. Each day all the pupils of the class were randomly assigned to each of the four observers using Method B.

In order to determine which procedures of Method A and Method B were most efficient without actually carrying out each observational variation in the classroom, the data collected by the six observers were statistically analyzed. The statistical treatment of the data permitted observational designs to be built and their efficiency to be tested by comparing them to the criterion measure. Therefore, through this statistical investigation, it was possible to examine a series of permutations which sampled various numbers of pupils, time intervals, and time periods. The criterion measure utilized was the cumulative total of all observations obtained on all pupils every thirty seconds for twenty days.

General Rationale of the Study

This study sought to find an efficient approach for obtaining reliable observational data on the classroom behaviors of a class. An attempt was made to statistically examine the data collected in order to determine whether the principle of obtaining a representative sample by random sampling could be applied to observational measurements. There had been no previous research of this kind to provide direction for this investigation; therefore, it was regarded as being exploratory and methodological in nature.

Through the manipulation of four variables, it was possible to examine the effect of changing observational procedures. The variables studied were: (1) the time interval between recordings, (2) the length of the observation period, (3) the number of days of observing, and (4) the number of pupils observed. These variables were chosen on the premise that they would interact to either increase or decrease the number of classroom observations required to reach efficient agreement with the criterion measure. If one or two of the variables were held constant, it was expected that the remaining variables would interact. For example, if the time interval and the observation period were held constant, the number of days necessary for observation would be dependent upon the number of pupils observed. It was expected that as the number of days of observation increased, the number of pupils necessary to observe would decrease. Also, it was expected a smaller time interval and a longer observation period would decrease the number of days or pupils required. It was anticipated that through this investigation that the optimal conditions of each variable could be established.

It was recognized, however, that this study was constrained by several factors among these being the classroom and grade level utilized, the subject area, the size of the class, the observational variables and the observation form, and the observer training.

Hypotheses

General Hypothesis

The activity measurements of observational Method A agree with those of Method B.

Specific Hypotheses

Hypothesis I: The acceptable level of agreement is attained between the cumulative measurement obtained by Method A at each given time interval (2, 4, 6, 8, 10, 12, and 14 minutes) for thirty minutes for one through twenty days and Criterion I.

Hypothesis II: The acceptable level of agreement is attained between the cumulative measurement obtained by Method A at each given time interval (2, 4, 6, 8, 10, 12, and 14 minutes) for thirty minutes for one through twenty days and Criterion II.

Hypothesis III: The acceptable level of agreement is attained between the cumulative measurement obtained by Method B at each given time interval (30 seconds, 1, 2, 4, 6, 8, 10, 12, and 14 minutes) for a sampling of pupils (one through thirty-three pupils) for thirty minutes for one through twenty days and Criterion I.

Hypothesis IV: The acceptable level of agreement is attained between the cumulative measurement obtained by Method B at thirty-second time intervals for each given observation period (5, 10, 15, and 20 minutes) for a sampling of pupils (one through thirty-three pupils) for one through twenty days and Criterion I.

Hypothesis V: The acceptable level of agreement is attained between the cumulative continuous measurement obtained by Method B on a sampling of pupils (2, 3, 6, and 15 pupils) at each given time interval (30 seconds, 1, 2, 5, 10, and 15 minutes) during each given observation period (2, 5, 10, and 15 minutes) within a thirty-minute

observation period for one through twenty days and Criterion I.

Hypothesis VI: The acceptable level of agreement is attained between the cumulative intermittent measurement obtained by Method B on a sampling of pupils (5, 10, and 15 pupils) at each given time interval (30 seconds, 1, and 2 minutes) in sub-cycles of each given length (2 1/2, 5, 7 1/2, 10, 15, 20, and 30 minutes) within a thirty-minute observation period with the same pupils in each cycle for one through twenty days and Criterion I.

Hypothesis VII: The acceptable level of agreement is attained between the cumulative intermittent measurement obtained by Method B on a sampling of pupils (10, 15, and 30 pupils) at each given time interval (30 seconds and 1 minute) in sub-cycles of each given length (5, 10, and 15 minutes) within a thirty-minute observation period with five different pupils in each cycle for one through twenty days and Criterion I.

Definition of Terms

Acceptable level of agreement: a Scott coefficient of .85.

Criterion Measure: a cumulative measure of the time pupils spend engaged in various classroom activities obtained by summing a series of daily classroom activity observations over time.

Criterion I: the cumulative measure obtained by summing the activity observations on thirty-three students recorded at thirty-second intervals for a period of thirty minutes for twenty days.

Criterion II: the cumulative measure obtained by summing the activity observations on thirty-three students recorded at the same intervals being compared to the criterion, i.e., 2, 4, 6, 8, 10, 12, and 14 minutes, for a period of thirty minutes for twenty days.

Direct Observation Method: a method which requires an observer to classify behaviors directly in the classroom.

Efficiency: the power of an observation method to produce a Scott coefficient of .85 in the least amount of time.

Individually Prescribed Instruction (IPI): an individualized program whose flexible curriculum provides a variety of adaptable learning materials and techniques and permits a pupil to become actively involved in the learning process through self-evaluation and whole or partial self-direction and self-selection of learning activities so that he can make regular progress towards academic mastery at his own rate.

Observation: the behavior recorded at the beginning of each time interval.

Observation Method A: an observational method utilizing only one observer to ascertain the amount of time a class spends engaged in various classroom activities.

Observation Method B: an observational method for ascertaining the amount of time a randomly selected group of pupils spends engaged in various classroom activities.

Observation Period: the length of time spent each day recording behaviors.

Scott coefficient (π): a statistical index indicating the inter-coder agreement for nominal-scale judgments.[1]

Time Interval: the smallest given time period for recording behaviors.

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[1] William A. Scott and Michael Wertheimer, Introduction to Psychological Research (New York: John Wiley & Sons, 1962).

CHAPTER III

DESIGN OF THE STUDY

Setting of the Study

This research was conducted to investigate the efficiency of two direct classroom observation methods which utilized time sampling techniques. Although the resulting generalizations and implications of this study have applicability to other individualized programs, the research focused on the Individually Prescribed Instruction program developed by the Learning Research and Development Center at the University of Pittsburgh.

Overall Description

Although both of the methods examined utilized time sampling techniques, they were two basically different methods. One procedure (Method A) utilized the observer to classify and record the activities of the entire class at designated time intervals. The other procedure (Method B) followed the activities of selected individuals. Individual activity records were kept for each pupil observed with the latter method while the former method required only class records.

Both methods were compared to a criterion to determine the degree of agreement. These measures were then used to determine the minimum number of students to be observed and the minimum observing time required for each method to be efficient. The

more efficient measures were then compared to ascertain the more efficient method for monitoring student activities in the classroom.

The dimensions that were examined in determining the efficiency of each method were: (1) the length of the various intervals within an observational period, (2) the length of the observational period within a fixed class period, (3) the number or series of observational periods over a designated number of school days, and (4) the minimum number of students necessary to observe.

The observation plan of this research is shown in Figure I.

CRITERION	METHOD A	METHOD B
Observations on Each Class Member	Observations on Entire Class	Observations on Randomly Selected Pupils
Observations at Designated Intervals	Observations at Designated Intervals	Observations at Designated Intervals
Several Observers Required per Class	One Observer Required per Class	Several Observers Required per Class
Same Overall Observation Time Period		

FIGURE I

OBSERVATION PLAN

The Criterion Measure

The criterion measure consisted of the cumulative activity recordings of each individual in the class. These activity recordings were obtained by four observers, each of whom recorded the activities of several pupils during the same designated time interval. Separate records

were kept for each pupil. Preliminary research had determined that one observer could accurately record the activities of nine pupils every thirty seconds under the following conditions:

1. The observer was familiar with the materials and procedures of the classroom.

2. Before the observation period began, the observer checked on the materials or equipment being used by the pupils observed.

3. There was a proximity in the seating arrangement of the pupils observed.

4. The observation interval allowed sufficient time for recording the activities of the observed pupils on the Classroom Observation Schedule.

5. The observer recorded only the activities taking place in the classroom and did not follow the pupil out of the room.

Figure II represents the observation plan for one day for a class of thirty-three pupils. Each "x" represents the classroom activity recorded for each pupil at the beginning of the indicated time interval. The thirty-minute criterion measures were made on the same class for twenty class periods. Criterion I, the twenty-day every thirty-second cumulative criterion, was obtained by summing the daily activities recorded every thirty seconds for thirty minutes on a class of thirty-three pupils for a period of twenty days.

In order to compare the agreement of the measurements obtained by Method A to a criterion obtained at the same time intervals, a number of twenty-day cumulative criterions were cumulated. Each cumulative measurement, Criterion II, was obtained by summing the daily activities recorded at each given time interval for thirty minutes on a class of thirty-three pupils for a period of twenty days.

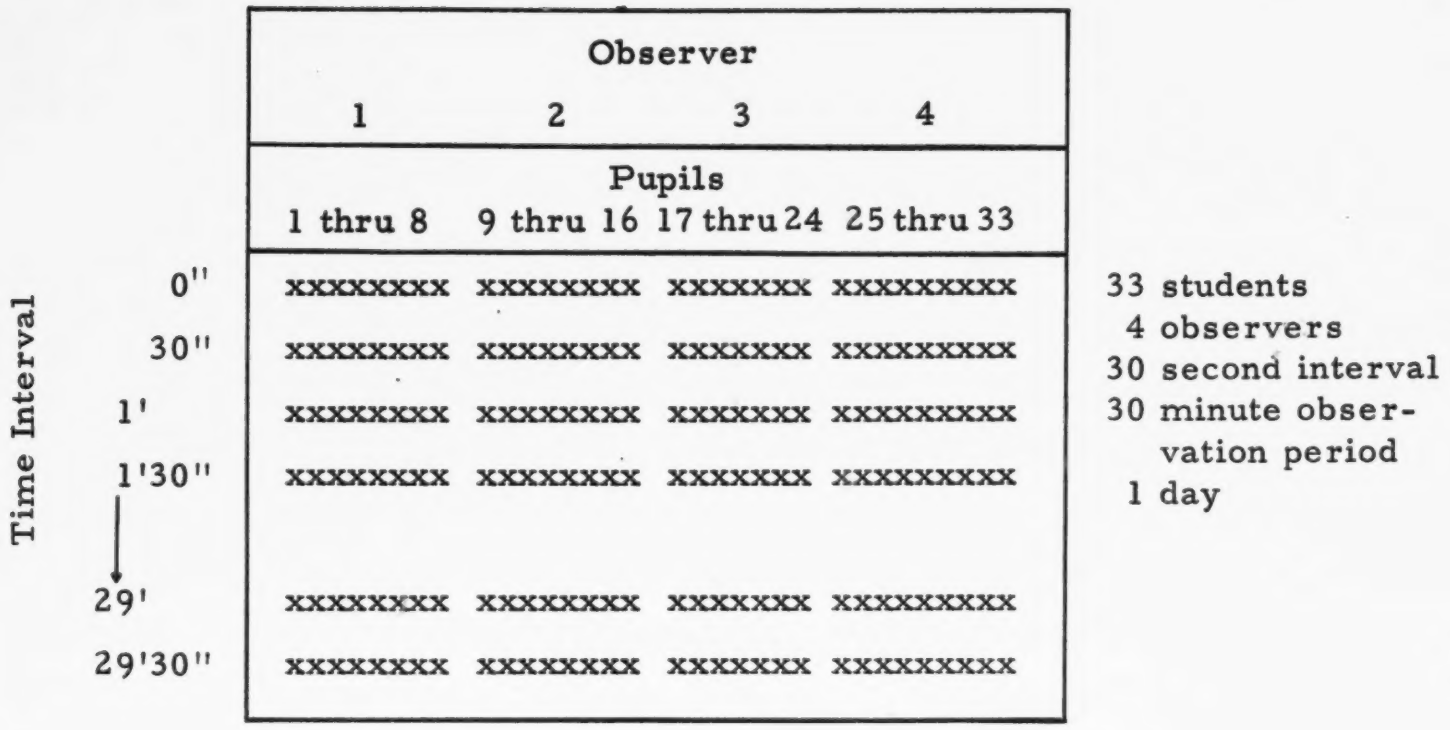

FIGURE II

THE CRITERION MEASURE OBSERVATION PLAN FOR ONE DAY

Observation Method A

Method A required a single observer to note the activities of the pupils in the entire class and record the activity of each pupil on the Classroom Observational Schedule. The activity of every student in the class was accounted for at the beginning of each designated time interval. Therefore, the number of tallies on the Classroom Observational Schedule for a designated time interval was equal to the number of students in the class. From past research, it was found that it was possible for an observer to repeat this procedure at the beginning of every two minutes. Since each observing interval required two minutes, fifteen recordings were made for each pupil during a thirty-minute observation period. When Method A was employed, individual records were not maintained, only class records. However, before the observation method was

put into operation in the classroom, certain classroom criteria had to be satisfied. The criteria were as follows:

1. The class was an individualized class and not teacher directed.

2. The size of the class did not exceed forty pupils.

3. Pupil activities were taking place in the same classroom.

4. The pupils were working independently or in small groups.

5. The classroom was operating under normal management conditions.

6. The activities of the pupils were not the result of a general class assignment.

For this part of the research, two observers were assigned to the classroom so that the coefficient of observer agreement could be determined for Method A. The classroom was observed at two-minute intervals for a period of thirty minutes on twenty occasions. The data for Method A were collected at the same time as the criterion measure. Figure III shows the matrix of observational data obtained when Method A was used for one day.

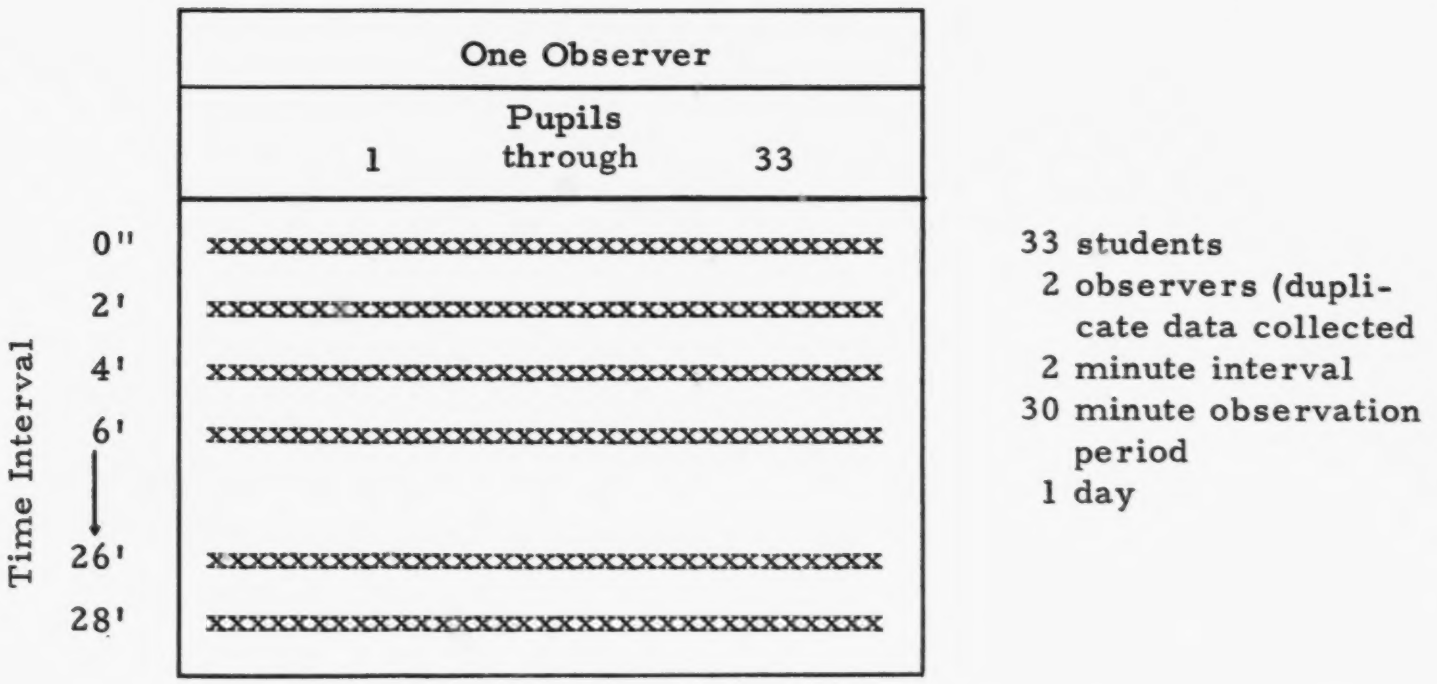

FIGURE III

OBSERVATION METHOD A FOR ONE DAY

Method A was examined to include several variations of the time interval. The various intervals explored are shown in Table I. For example, all activities recorded for the thirty-three students at the beginning of every two minutes were cumulated for thirty minutes for days one through twenty. The same procedure was followed for the four-minute interval as well as the 6, 8, 10, 12 and 14 minute intervals.

TABLE 1

VARIATIONS OF THE TIME INTERVAL
FOR METHOD A

Method A Interval	Observation Period	Days of Observation	No. of Pupils Observed
2 min	30 min	1 through 20	33
4 min	30 min	1 through 20	33
6 min	30 min	1 through 20	33
8 min	30 min	1 through 20	33
10 min	30 min	1 through 20	33
12 min	30 min	1 through 20	33
14 min	30 min	1 through 20	33

Observation Method B

Observation Method B is a procedure for noting and recording the classroom activities of an individual pupil at designated time intervals over a given time period. Separate data were not collected for this method but the data from the criterion measure were utilized since, in actuality, the criterion represented an extreme example of Observation Method B.

To investigate Method B, sub-sets of the criterion measure data were examined and compared to the total criterion measure. This part of the research study explored the efficiency of selected variations of the method of following one pupil in order to obtain an accurate summary of classroom activities. Two different techniques were followed for collecting data for Observation Method B. One technique allows the observer to collect data on individual pupils through a series of almost continuous observations on the same pupil over a given time period. The other

technique yields data collected intermittently but individually on several students. Various facets and possibilities of each of these techniques were examined. It must be recognized, however, that there were general criteria that had to be satisfied before using either of these techniques. The following are the criteria which were met before Observation Method B was employed:

1. The pupil was working either on an individual basis, in pupil-pupil activity, or in small groups.

2. The pupil was part of an individualized class.

3. The classroom was operating under normal management conditions.

4. The pupil was not working on a general class assignment.

The first sample to be examined and compared to the criterion measure involved the classroom activities of only one student. A student was randomly selected from the pool of students observed on the first day. The resulting data were the activity data on that student as recorded by one observer during the observation period. For that same day, a second random pupil selection was made from the pool of observed students. The second student might have been observed by another observer or by the same observer since four observers were simultaneously recording data in the classroom. The activity data of the second student were then added to that of the first student. This procedure was continued until all students who were observed on the first day were selected. The cumulative data of these students are represented by the first column shown in Figure IV. After these selections were made and totaled, the same process was carried out for the second day's observational data. However, the second day's data were then added to the first day's data. The cumulative adding of days for a constant number of students is represented by the rows in Figure IV. The resulting matrix yield

random sampling data for pupils and days which could then be compared to the criterion measure. The last "x" in the last column represents Criterion I. Each "x" in the last row of the matrix represents Criterion II for the same number of days as is indicated at the top of the column in which the "x" appears. For example, the first "x" of the last row is Criterion II for day one, while the second "x" of the last row represents Criterion II for two days, and the third "x" represents Criterion II for three days.

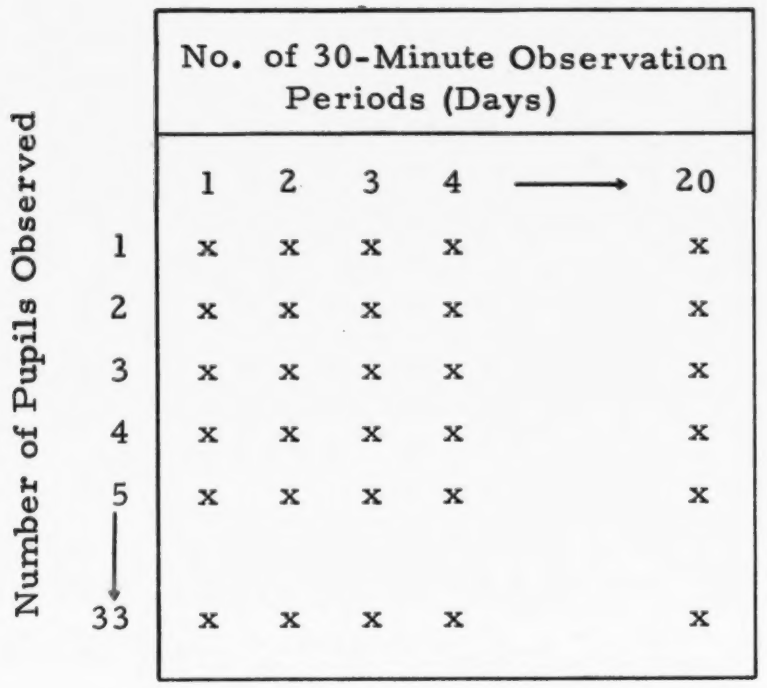
No. of 30-Minute Observation Periods (Days)
1 2 3 4 ⟶ 20
Number of Pupils Observed
1 x x x x x
2 x x x x x
3 x x x x x
4 x x x x x
5 x x x x x
33 x x x x x
Proposed:
33 students (daily random selection)
4 observers
30 second intervals
30 minute period (1 day)
20 days

FIGURE IV

PLAN FOR OBTAINING OBSERVATIONAL MEASURES FOR METHOD B

A further variation of the continuous technique investigated was that of varying the time interval while holding the other time elements constant. These variations are shown in Table 2.

TABLE 2

RECORDING VARIATIONS OF THE TIME INTERVAL WITHIN A THIRTY-MINUTE OBSERVATION PERIOD METHOD B

Method B Interval	Observation Period	Days of Observation	No. of Pupils Observed
30 sec	30 min	1 through 20	1 through 33
1 min	30 min	1 through 20	1 through 33
2 min	30 min	1 through 20	1 through 33
4 min	30 min	1 through 20	1 through 33
6 min	30 min	1 through 20	1 through 33
8 min	30 min	1 through 20	1 through 33
10 min	30 min	1 through 20	1 through 33
12 min	30 min	1 through 20	1 through 33
14 min	30 min	1 through 20	1 through 33

Another change that was examined was that of varying the observation period while holding the time interval and the other time elements constant, as presented in Table 3.

TABLE 3

VARIATIONS OF THE LENGTH OF THE OBSERVATION PERIOD FOR THE THIRTY-SECOND RECORDING INTERVAL METHOD B

Method B Interval	Observation Period	Days of Observation	No. of Pupils Observed
30 sec	5 min	1 through 20	1 through 33
30 sec	10 min	1 through 20	1 through 33
30 sec	15 min	1 through 20	1 through 33
30 sec	20 min	1 through 20	1 through 33

A final variation of the continuous observation technique involved the random selection of several students to be observed at different times during the observation period. Each of the selected pupils was observed by one observer for a continuous period of time within a thirty-minute observation period. For example, when three pupils were selected to be continuously observed by one observer at thirty-second intervals, one student was observed every thirty seconds for the first ten minutes of the thirty-minute observation period, and then during the next ten minutes the second student was observed every thirty seconds, and during the final ten minutes the third pupil was observed every thirty seconds. The number of sub-cycles within the thirty-minute observation period was equal to the number of pupils selected. For example, when fifteen students were selected, there were fifteen sub-cycles of two minutes each with only one pupil being observed during each cycle. Table 4 is a summary table which shows the observation time per pupil and the number of pupils who were observed by one observer utilizing this procedure with the interval time being held constant within each thirty-minute observation period.

TABLE 4

VARIATIONS OF THE NUMBER OF PUPILS OBSERVED
WITHIN A THIRTY-MINUTE OBSERVATION PERIOD
CONTINUOUS OBSERVATION - ONE STUDENT EACH CYCLE

Method B Interval	Observation Time per Pupil	No. of Pupils Observed Daily	Days of Observation
30 sec	2 min	15	1 through 20
30 sec	5 min	6	1 through 20
30 sec	10 min	3	1 through 20
30 sec	15 min	2	1 through 20
1 min	2 min	15	1 through 20
1 min	5 min	6	1 through 20
1 min	10 min	3	1 through 20
1 min	15 min	2	1 through 20
2 min	2 min	15	1 through 20
2 min	5 min	6	1 through 20
2 min	10 min	3	1 through 20
2 min	15 min	2	1 through 20
5 min	5 min	6	1 through 20
5 min	10 min	3	1 through 20
5 min	15 min	2	1 through 20
10 min	10 min	3	1 through 20
15 min	15 min	2	1 through 20

A second type of data collecting technique utilizing observation Method B was to observe students individually but at intermittent intervals. For example, when five pupils were observed by one observer, the activity of only one of the five pupils was recorded at the beginning of the first thirty-second interval while the activity of the second pupil was recorded at the beginning of the second thirty-second interval. This procedure was repeated until all students were observed and required two and one half

minutes for five pupils. The recording of the fifth student's activity completed one cycle. At the beginning of the sixth thirty-second interval, the first student was once again observed and his activity recorded. Each pupil was observed twelve times during the thirty-minute observation period or every two and one half minutes. A random selection of students was made daily. Table 5 exhibits the varying time elements explored as the daily thirty-minute observation period was held constant.

TABLE 5

INTERMITTENT SUB-CYCLE OBSERVATIONS
SAME STUDENTS - EACH CYCLE

Method B Interval	Sub-Cycle Time	No. of Sub-Cycles	No. of Pupils Observed Daily	Days of Observation
30 sec	2 1/2 min	12	5	1 through 20
1 min	5 min	6	5	1 through 20
2 min	10 min	3	5	1 through 20
30 sec	5 min	6	10	1 through 20
1 min	10 min	3	10	1 through 20
2 min	20 min	1	10	1 through 20
30 sec	7 1/2 min	4	15	1 through 20
1 min	15 min	2	15	1 through 20
2 min	30 min	1	15	1 through 20

Another variation of this second technique of observing pupils individually but intermittently was to have sub-cycle observation periods within the main observation period. In this way the number of students observed during one observation period by one observer

was able to be increased. For example, if one observer observed five students intermittently for ten minutes at thirty-second intervals and then observed five other students intermittently for the next ten minutes, it was possible for the observer to record the activities of fifteen students during a thirty-minute observation period. A total of four recordings was made on each pupil when this procedure was utilized. The technique of observing pupils intermittently can actually be used to observe an entire class. For example, one student could be observed at the beginning of a designated time interval and then at the beginning of the second interval, the activity of the next nearest pupil could be observed. This procedure could be continued until the whole class was observed once and then the cycle could be repeated. For a class of thirty pupils with a time interval of fifteen seconds, it would take one observer seven and one half minutes to observe all students once. During a thirty-minute observation period, each member of the class would be observed four times. A summary table presenting the variations which were examined using this technique is shown in Table 6.

TABLE 6

INTERMITTENT SUB-CYCLE OBSERVATIONS
EACH CYCLE - DIFFERENT STUDENTS

Method B Interval	Sub-Cycle Time	No. of Pupils in Sub-Cycle	No. of Pupils Observed Daily	Days of Observation
30 sec	5 min	5	30	1 through 20
30 sec	10 min	5	15	1 through 20
30 sec	15 min	5	10	1 through 20
1 min	5 min	5	30	1 through 20
1 min	10 min	5	15	1 through 20
1 min	15 min	5	10	1 through 20

Through comparing the various variations of the two techniques of using Observation Method B, the most efficient variation and technique of Method B was determined. The efficiency of this technique was in turn compared to the most efficient procedure of Method A.

Sample Population

The population was drawn from the McAnnulty Elementary School in the Baldwin-Whitehall School District. This school was chosen because of its close association with the University of Pittsburgh research staff. In September, 1964 Individually Prescribed Instruction was introduced into the curriculum at Oakleaf Elementary School in the Baldwin-Whitehall School District by the University of Pittsburgh. The following year McAnnulty held its first Individually Prescribed Instruction class. These classes are held for grades one through six.

The population for this study was a fifth grade IPI mathematics class at McAnnulty Elementary School. This grade was chosen because of the nature of the study. A large room was needed to accommodate several observers without interfering with the normal activities of the pupils; few classrooms met this requirement. Also, the activities of this grade level are typical of the upper grade levels in the elementary school.

Total Number of Classes to be Observed

During the fall of 1969 for a period of approximately six weeks, six observers, two using Method A and four using Method B, were assigned to a single classroom. These six observers obtained observational data on the student activities within this classroom for a total of twenty class periods.

Observers

The observers used in this study were members of the Baldwin-Whitehall community who were given a series of training sessions for a period of eleven days. Not only is it necessary that observers have a thorough knowledge of the procedures and materials of the Individually Prescribed Instruction curriculum, they must also be thoroughly familiar with the Classroom Observational Schedule. A detailed discussion of observer training can be found in Appendix B.

Observers trained for recording the criterion measure were required to observe individual students in practice sessions before the actual collection of data began. In order to establish reliability between observers, the same pupils were observed by all observers for designated time periods.

All observers were also trained to follow Observation Method A. During practice sessions, each observer was required to observe and record the activities of an entire Individually Prescribed Instruction classroom at the beginning of every two minutes for thirty minutes.

Observers were assigned periodically on a random basis to follow either Observation Method A or to obtain criterion observational measures.

Instrument

This study employed a revised and reorganized form of the Student Observation Form devised by Lindvall, Yeager, Wang, and Wood[1] for observing Individually Prescribed Instruction classes. The schedule was designed to be used in conjunction with a systematic observational procedure for the purpose of measuring the amount of time a class spends engaged in various activities while in an IPI class.

Since one of the goals of IPI is to allow each pupil to progress at his own learning rate, the curriculum provides for the student to engage in independent study and other activities which will facilitate his progress. Each of the major categories of the schedule pertains to either one or several of the following six basic goals identified by Lindvall, Cox, and Bolvin.[2]

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[1] C. M. Lindvall, John L. Yeager, Margaret Wang, and Carolyn Wood, "Manual for IPI Student Observation Form," in Mirrors for Behavior: An Anthology of Classroom Observation Instruments, Vol. III (12), ed. by Anita Simon and E. Gil Boyer (Philadelphia, Penn.: Research for Better Schools, 1967), pp. 1-6.

[2] C. M. Lindvall and Richard C. Cox with John O. Bolvin, Evaluation as a Tool in Curriculum Development: The IPI Evaluation Program, AERA Monograph Series on Curriculum Evaluation, No. 5 (Chicago: Rand McNally and Co., 1970), pp. 30-34.

I. Every pupil makes regular progress towards mastery of instructional content.

II. Every pupil proceeds to mastery of instructional content at an optimal rate.

III. Every pupil is engaged in the learning process through active involvement.

IV. The pupil is involved in learning activities that are wholly or partially self-directed and self-selected.

V. The pupil plays a major role in evaluating the quality, extent, and rapidity of his progress towards mastery of successive areas of the learning continuum.

VI. Different pupils work with different learning materials and techniques of instruction adapted to individual needs and learning styles.

The following is a listing of the major categories on the observation schedule and a description of each of the six types of categories.

I. Independent - Involvement with materials

Any classroom activity in which the pupil is independently involved with curriculum materials or equipment would be an independent - involvement with materials type of activity.

II. Independent - Non-involvement with materials

A pupil activity which does not involve another person, curriculum materials or equipment is an independent - non-involvement with materials type of activity.

III. Interaction - Peer Group - two or more pupils

All activities in which the pupil becomes involved with one or more of his peers for social or instructional purposes are interaction - peer group activities.

IV. Interaction - Teacher-Student

All pupil activities which require involvement between the teacher and pupil or require the assistance of the teacher are interaction - teacher-student activities.

V. Interaction - Teacher Aide-Student

All pupil activities involving the teacher aide or related to pupil involvement with the teacher aide are considered interaction - teacher aide-student activities.

VI. Teacher directed group instruction - two or more students

All classroom activities involving the teacher and two or more students or the entire class are classified teacher directed group instruction activities.

CHAPTER IV

PRESENTATION AND THE ANALYSIS OF DATA

This investigation has been conducted for the primary purpose of examining the efficiency of the method of obtaining entire class observational activity data in an individualized classroom with that of obtaining observational data on selected individuals in the class. This problem has been approached by determining the degree of agreement between the two methods and a criterion measure. In addition, the agreement between selected time intervals and sample sizes for each of the two methods has been examined with respect to the criterion measure.

Obtaining and Utilizing the Criterion Measure

As has been previously explained in the design of this study, one of the major concerns was the determination of a criterion. This was accomplished by recording the activity of each of the thirty-three students in the class every thirty seconds for thirty minutes for a period of twenty days. Throughout the twenty-day observation period, the frequency count for all students for each of the six categories was added to the previous day's count for the same category. The cumulative criterion for the twenty-day time period is shown in Table 7 while the daily cumulative data for one through twenty days are presented in Table 8.

TABLE 7

FREQUENCIES AND PERCENTAGES FOR THE TWENTY-DAY CUMULATIVE CRITERION RECORDED EVERY THIRTY SECONDS FOR THIRTY MINUTES FOR THIRTY-THREE STUDENTS FOR EACH CATEGORY

		Frequency	Percentage
Category	1	24,607	62.55
	2	10,404	26.45
	3	2,128	5.41
	4	1,434	3.65
	5	425	1.08
	6	340	.86
Totals		39,338	100.00

Since a criterion measure was obtained each time a classroom was observed, it was possible to determine:

(1) The degree of agreement between the major category measures of the criterion and the major category measures obtained by observation Method A.

(2) The degree of agreement between the major category measures of the criterion and the major category measures obtained by observation Method B.

Studies were employed not only to investigate the extent of agreement occurring over time but also to ascertain the effect of varying the number of pupils observed.

The degree of agreement was indicated by the resulting Scott[1] coefficient, π . The Scott coefficient is an index of agreement which

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[1] William A. Scott and Michael Wertheimer, Introduction to Psychological Research (New York: John Wiley & Sons, 1962), pp. 193-196.

TABLE 8

FREQUENCIES AND PERCENTAGES FOR THE DAILY CUMULATIVE CRITERION RECORDED EVERY THIRTY SECONDS FOR THIRTY MINUTES FOR THIRTY-THREE STUDENTS FOR EACH CATEGORY

Cumulative Number of Days	FREQUENCY							PERCENTAGE					
	Category							Category					
	1	2	3	4	5	6	Total	1	2	3	4	5	6
1	1,086	687	101	76	14	7	1,971	55.10	34.86	5.12	3.86	.71	.36
2	2,478	1,117	187	137	23	8	3,950	62.73	28.28	4.73	3.47	.58	.20
3	3,823	1,570	217	231	72	8	5,921	64.57	26.52	3.66	3.90	1.22	.14
4	5,157	2,049	251	299	97	8	7,861	65.60	26.07	3.19	3.80	1.23	.10
5	6,504	2,484	317	405	123	8	9,841	66.09	25.24	3.22	4.12	1.25	.08
6	7,760	3,074	371	463	145	8	11,821	65.65	26.00	3.14	3.92	1.23	.07
7	8,885	3,645	549	519	158	12	13,768	64.53	26.47	3.99	3.77	1.15	.09
8	9,915	4,126	679	571	185	257	15,733	63.02	26.23	4.32	3.63	1.18	1.63
9	10,793	4,718	1,076	634	211	266	17,698	60.98	26.66	6.08	3.58	1.19	1.50
10	12,010	5,182	1,283	696	230	276	19,677	61.04	26.34	6.52	3.54	1.17	1.40
11	13,271	5,699	1,362	765	245	276	21,618	61.39	26.36	6.30	3.54	1.13	1.28
12	14,530	6,259	1,423	832	261	276	23,581	61.62	26.54	6.03	3.53	1.11	1.17
13	15,822	6,708	1,527	901	286	276	25,520	62.00	26.29	5.98	3.53	1.12	1.08
14	17,097	7,262	1,594	964	307	276	27,500	62.17	26.41	5.80	3.51	1.12	1.00
15	18,245	7,724	1,729	1,089	333	333	29,453	61.95	26.22	5.87	3.70	1.13	1.13
16	19,435	8,339	1,840	1,133	351	335	31,433	61.83	26.53	5.85	3.60	1.12	1.07
17	20,826	8,782	1,897	1,200	364	335	33,404	62.35	26.29	5.68	3.59	1.09	1.00
18	22,105	9,310	1,983	1,258	382	340	35,378	62.48	26.32	5.61	3.56	1.08	.96
19	23,281	9,880	2,097	1,351	409	340	37,358	62.32	26.45	5.61	3.62	1.09	.91
20	24,607	10,404	2,128	1,434	425	340	39,338	62.55	26.45	5.41	3.65	1.08	.86

is obtained after the frequency data have been corrected for chance. Further information and the details for computing the Scott coefficient can be found in Appendix A. For this study, a Scott coefficient of .85 or greater was utilized to indicate agreement. This acceptance level is in accordance with the standard set by Flanders[1] in training observers to use the Flanders' Interaction procedures.

Observation Method A

As has been previously mentioned, Method A is an observational method which requires an observer to obtain activity data on an entire class. In this study two observers were used in the classroom at the same time to collect observations by Method A. This procedure was followed so that the daily observer agreement of Method A could be determined. Each day two observers were randomly chosen from the pool of observers and assigned to follow Method A. The results in this study have been obtained by averaging the daily frequency counts of the two observers.

Observer Agreement

In order to examine how closely two observers employing Method A in the same classroom at the same time agreed, coefficients of agreement were computed on a daily basis. Table 9 presents the daily degree of agreement between observers. This table shows that the coefficients for only eight days, namely 1, 3, 4, 5, 6, 7, 12, and 19,

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[1] Ned A. Flanders, "Interaction Analysis in the Classroom: A Manual for Observers," in Mirrors for Behavior: An Anthology of Classroom Observation Instruments, Vol. II (5) ed. by Anita Simon and E. Gil Boyer (Philadelphia, Penn.: Research for Better Schools, 1967), p. 17.

reached a level of agreement of .85 or above. Days 17 and 20 were close with .84 and .83 respectively. The next highest coefficients were for days 11, 15, and 18 which were .67, .68, and .67 respectively. However, on days 8, 9, 10, 13, and 16 the recordings agreed only at a level of .58 or lower.

TABLE 9

DAILY SCOTT COEFFICIENTS OF OBSERVER AGREEMENT FOR METHOD A

Day	Scott Coefficient	Day	Scott Coefficient
1	.85	11	.67
2	.71	12	.95
3	.87	13	.58
4	.91	14	.75
5	.88	15	.68
6	.87	16	.47
7	.93	17	.84
8	.55	18	.67
9	.56	19	.85
10	.50	20	.83

Since the prestudy data[1] indicated that the observers were adequately trained to classify and record pupil activities, it is possible that low coefficients of agreement may not be a reflection of inaccuracy in the recording of observations by the observer but could occur for several other reasons. For example, even though the observers may start recording class activities together at the beginning of the interval, there may be a change within the interval among observers for the

[1] See Appendix B for training data.

actual recording of an individual's activity. Then if a pupil changes his activity during the interval, one observer may record one activity while the other observer records another and yet both observers have recorded accurate observations. This would then account for the difference between observer recordings for the same time interval. Also, on some days more pupils change their activities within a time interval than on other days making it more difficult, if not at times impossible, for one observer to observe and record the activities of an entire class.

Time Interval Variations for Recording During the Thirty-Minute Observation Period

Several time intervals were investigated to determine whether all the variations would consistently reach an acceptable level of agreement and, if it was attained, the number of days that were required. The daily average frequency counts of two observers were utilized in the comparison of all Method A variations to Criterion I and Criterion II.

The first set of analyses that were undertaken was the degree of agreement with Criterion I, the twenty-day cumulative criterion. These investigations were carried out to test hypothesis I: The acceptable level of agreement is attained between the cumulative measurement obtained by Method A at each given time interval (2, 4, 6, 8, 10, 12, and 14 minutes) for thirty minutes for one through twenty days and Criterion I. Data for Method A were collected in the classroom every two minutes and then sampled to investigate the other given intervals. All of the Scott coefficients for these comparisons are shown in Table 10.

The two-minute interval was the smallest interval to be investigated for Method A. At this interval the required Scott coefficient

TABLE 10

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN METHOD A OBSERVATIONS RECORDED AT VARIOUS TIME INTERVALS AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Time Interval in Minutes						
	2	4	6	8	10	12	14
1	.81	.80	.79	.74	.75	.74	.78
2	.74	.74	.72	.74	.90	.76	.86
3	.73	.74	.61	.69	.89	.64	.85
4	.69	.70	.59	.67	.85	.62	.78
5	.69	.70	.56	.70	.81	.64	.79
6	.71	.72	.57	.72	.78	.63	.76
7	.73	.73	.59	.72	.76	.64	.74
8	.74	.74	.62	.71	.76	.67	.73
9	.80	.80	.68	.78	.82	.73	.79
10	.82	.82	.72	.81	.82	.75	.79
11	.84	.85	.75	.84	.82	.77	.79
12	.83	.83	.73	.82	.80	.75	.79
13	.82	.83	.74	.80	.79	.75	.78
14	.83	.83	.74	.80	.78	.74	.78
15	.85	.85	.76	.83	.79	.77	.80
16	.85	.85	.76	.84	.78	.77	.81
17	.84	.84	.76	.84	.78	.77	.82
18	.84	.84	.75	.83	.77	.78	.82
19	.85	.85	.78	.85	.79	.79	.81
20	.84	.84	.77	.84	.78	.78	.81

*Underlined values indicate agreement level of .85 or greater.

level of agreement was reached only after the data had been cumulated for the fifteenth, sixteenth, and nineteenth days but then it decreased to .84 when the twentieth day's observations were added as it did when days seventeen and eighteen were added. Furthermore, it was noted that nine days of cumulating observations were necessary before a consistent .80 or above level of agreement was maintained.

The next larger interval considered was the four-minute interval. The coefficients at this interval were almost identical to those computed for the two-minute interval but the first .85 appeared slightly sooner. On the basis of these data, apparently nothing was gained by recording student activities every two minutes rather than every four.

When the six-minute interval was examined, a decrease in the resulting coefficients was noted. At no time was the required .85 level of agreement reached nor even a .80 level. However, once again at the eight-minute interval, the recordings yielded Scott coefficients at the .80 level after ten days of cumulating data. The required .85 level was attained only after nineteen days of recording but then decreased to .84 when the twentieth day's activities were added. Evidently the activities recorded in this study for the eight-minute interval were more representative of the total criterion activities than those recorded for the six-minute interval.

Activities were also recorded for the 10, 12, and 14 minute intervals but inspection showed that the coefficients of agreement even after twenty days failed to reach the acceptance level of .85. There were a few acceptably high coefficients computed for these intervals during the first few days of the study but since the coefficients did not remain consistently at this level or become higher, these intervals cannot be recommended for recording activity data in an individualized classroom.

It was concluded from the previous analyses that there is little evidence to support hypothesis I. A level of agreement of .85 or higher was not consistently maintained between the 2, 4, 6, 8, 10, 12, or 14 minute time interval observations obtained by Method A and Criterion I during the twenty-day observation period.

The second set of coefficients which was examined was those that resulted from comparing Method A observations, cumulated daily, at various time intervals and a twenty-day cumulative criterion collected at the same corresponding time intervals, Criterion II. For these comparisons, each Criterion II was obtained by sampling the every thirty-seconds criterion data at given intervals. The coefficients of agreement were computed to test hypothesis II: The acceptable level of agreement is attained between the cumulative measurement obtained by Method A at each given time interval (2, 4, 6, 8, 10, 12, and 14 minutes) for thirty minutes for one through twenty days and Criterion II. The coefficients of agreement are recorded in Table 11.

A .85 level of agreement was computed on the sixteenth day between the cumulated Method A observations recorded every two minutes and the cumulative twenty-day criterion recorded every two minutes but it was not maintained on succeeding days. When the twenty-day every four-minute cumulative criterion was compared to the cumulative Method A observations recorded every four minutes, the indices reached an acceptable level on the eleventh day. This level was maintained except on the thirteenth day when a .84 was computed. The six-minute time interval for the criterion and Method A observations yielded an acceptable level on the nineteenth and twentieth days. For the eight-minute time interval, a .87 level of agreement was obtained on the eleventh day and a .85 on the

TABLE 11

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN METHOD A OBSERVATIONS RECORDED AT VARIOUS TIME INTERVALS AND THE TWENTY-DAY CUMULATIVE CRITERION FOR THE SAME TIME INTERVALS*

Cumulative Number of Days	Time Interval in Minutes						
	2	4	6	8	10	12	14
1	.81	.77	.72	.70	.67	.69	.77
2	.74	.77	.81	.78	.92	.84	.88
3	.72	.76	.71	.71	.93	.72	.87
4	.69	.73	.68	.70	.91	.70	.80
5	.68	.72	.65	.72	.89	.72	.82
6	.71	.75	.65	.74	.86	.72	.79
7	.73	.76	.68	.75	.84	.72	.76
8	.74	.77	.72	.73	.83	.75	.74
9	.80	.83	.77	.81	.89	.81	.81
10	.82	.84	.80	.84	.89	.82	.81
11	.84	.86	.83	.87	.89	.84	.81
12	.83	.85	.82	.85	.87	.83	.80
13	.83	.84	.82	.83	.86	.81	.79
14	.83	.85	.82	.83	.85	.81	.79
15	.84	.86	.84	.85	.86	.83	.81
16	.85	.87	.84	.86	.85	.83	.82
17	.84	.86	.83	.86	.85	.83	.83
18	.84	.85	.83	.85	.84	.84	.84
19	.84	.86	.86	.87	.86	.85	.83
20	.84	.85	.85	.85	.85	.85	.83

*Underlined values indicate agreement level of .85 or greater.

twelfth day but a slight drop to .83 occurred for days thirteen and fourteen. Days fifteen through twenty produced a consistent .85 or above level of agreement for the eight-minute time interval. The coefficients computed for the ten-minute interval were .85 or higher after the second day's observations were added, except for three days when a .83 or .84 was computed. A .85 level of agreement was reached on the nineteenth and twentieth days for the twelve-minute recording interval. The fourteen-minute recording interval comparisons did not reach a consistent .85 level of agreement.

A comparison of the coefficients in Table 11 with those in Table 10, computed with the cumulative every thirty-second twenty-day criterion, indicated that the magnitude of increase for the coefficients in Table 11 ranged from .01 to .10 for days two through twenty. Furthermore, the greatest increases took place when the 6, 10, and 12 minute time intervals were utilized. It was, therefore, concluded that when the criterion time interval is the same as that of the Method A time interval, the coefficients of agreement can be expected to be higher than when the same data are compared to the cumulative criterion obtained every thirty seconds. However, if the .85 level of agreement is desired, the data in this study did not strongly support hypothesis II which is concerned with obtaining acceptable degrees of agreement between observations obtained by Method A and those of the cumulative criterion recorded at the same intervals.

Observation Method B

As previously explained in Chapter III, Method B is an observational method which utilizes the observer to obtain activity data on

selected individuals in a classroom. By using four observers following Method B in the same classroom at the same time, it was possible to obtain observational records on each of the thirty-three students in the class.

It should be noted that Tables 12 through 25 are interpreted in the following manner. Each table represents cumulated days going down the table and cumulated students going across the table. For example, in Table 12 the coefficient - .38 in column 1, row 1, represents the degree of agreement between the criterion and the recordings for one student for one day. Similarly, in column 5, row 8, .92 is the coefficient of agreement between the criterion and the cumulated activity data for five students for a total of eight days. Each day students were selected randomly so that columns 1 through 33 represent the total number of students and not the number of specific students. Also, the recordings for each day were added to the previous total so that rows 1 through 20 represent the total number of days that activity data had been added and not a particular day.

Time Interval Variations for Recording During the Thirty-Minute Observation Period

In order to determine if the acceptable level of agreement of .85 would be attained by certain variations of the time interval for one through thirty-three pupils and the twenty-day every thirty-second cumulative criterion which is Criterion I, the coefficients shown in Tables 12 through 20 were examined. The investigation included not only examining the indices for each interval shown in Table 2 with respect to the number of pupils needed, but also the days required to reach the acceptable level. Exploring the coefficients in this manner enabled hypothesis III to be tested: The acceptable level of agreement is attained between the cumulative measurement obtained by Method B

at each given time interval (30 seconds, 1, 2, 4, 6, 8, 10, 12, and 14 minutes) for sampling of pupils (one through thirty-three) for thirty minutes for one through twenty days and Criterion I. To obtain data for each of the given intervals investigated, the twenty-day every thirty-second activity data were sampled.

The first table examined was Table 12. This table gives the Scott coefficients between the twenty-day every thirty-second cumulative criterior and the cumulative activities for one through thirty-three students every thirty seconds over a period of twenty days. In this matrix it can be seen that when each day for twelve days one student was randomly selected and the activity of these students recorded every thirty seconds, a Scott coefficient of .85 was reached. Further inspection of the same column in this table indicated that the level of agreement with some variability increased to .91 at the end of twenty days. When the activities of two students were cumulated, a .91 index was attained after eight days but decreased slightly below .85 for days nine through twelve. A .86 was reached after the thirteenth day's frequencies were added and this level was maintained or increased as each successive day was added until finally a .90 was reached at the end of twenty days. Further examination of this table revealed that after cumulating recorded observations for thirteen days, an acceptance level of .85 was maintained for one through thirty-three students. Translating this into required observer time, means that one observer could have recorded the activities of only two students, who were randomly selected each day, and reached an acceptance level of .85 after the thirteenth day of cumulating data.

It is interesting to note that after one day of totaling the activities of thirty-three students a coefficient of .85 was not achieved. However, it was only necessary to total the activities of fourteen students for two days to produce a .86 coefficient and sixteen pupils to

TABLE 12

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY THIRTY SECONDS FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.38	.17	.04	.15	.20	.75	.77	.73	.69	.81	.84	.72	.55	.63	.66	.72	.79	.79	.73	.74	.76	.78	.79	.70	.71	.72	.72	.74	.67	.72	.65	.67	.69
2	.07	.52	.43	.58	.68	.87	.86	.79	.75	.76	.74	.83	.84	.86	.86	.94	.94	.93	.92	.93	.92	.92	.91	.90	.90	.90	.90	.93	.92	.93	.91	.91	.92
3	.42	.74	.63	.68	.71	.87	.83	.85	.79	.79	.77	.85	.87	.86	.86	.91	.91	.90	.89	.90	.90	.88	.87	.88	.88	.87	.86	.88	.90	.89	.90	.90	.91
4	.53	.77	.73	.79	.82	.88	.86	.85	.84	.85	.84	.84	.86	.85	.85	.89	.89	.88	.88	.88	.88	.88	.87	.87	.86	.86	.85	.86	.88	.87	.88	.87	.87
5	.66	.71	.62	.70	.76	.89	.87	.86	.83	.86	.82	.85	.86	.84	.84	.87	.86	.86	.88	.87	.87	.84	.82	.83	.82	.82	.82	.83	.84	.83	.85	.83	.84
6	.72	.70	.66	.76	.79	.89	.86	.84	.79	.84	.81	.84	.85	.81	.81	.85	.85	.86	.88	.86	.87	.84	.82	.83	.82	.83	.82	.84	.86	.85	.87	.86	.86
7	.78	.81	.73	.83	.84	.89	.88	.86	.81	.86	.84	.87	.90	.86	.86	.89	.90	.91	.92	.91	.91	.91	.89	.90	.91	.91	.88	.90	.91	.91	.92	.91	.92
8	.83	.91	.85	.92	.92	.96	.96	.95	.90	.93	.92	.94	.96	.93	.92	.95	.97	.97	.97	.97	.96	.97	.95	.95	.93	.94	.93	.94	.95	.95	.96	.95	.95
9	.80	.81	.85	.86	.91	.87	.88	.90	.93	.90	.91	.89	.87	.91	.92	.91	.90	.90	.88	.90	.89	.91	.93	.92	.94	.93	.94	.94	.94	.94	.93	.94	.94
10	.81	.81	.86	.86	.91	.86	.86	.88	.91	.89	.90	.88	.86	.90	.91	.90	.90	.89	.88	.89	.90	.91	.93	.92	.93	.93	.93	.93	.94	.93	.93	.94	.94
11	.82	.84	.89	.92	.94	.91	.90	.93	.94	.92	.93	.91	.89	.92	.93	.92	.91	.91	.91	.92	.92	.93	.95	.94	.95	.94	.95	.95	.95	.95	.95	.95	.95
12	.85	.84	.92	.89	.94	.91	.90	.92	.96	.93	.95	.92	.90	.93	.94	.93	.92	.92	.92	.93	.93	.94	.96	.96	.97	.96	.97	.97	.97	.96	.96	.96	.96
13	.86	.86	.92	.94	.95	.94	.93	.96	.94	.96	.95	.94	.93	.95	.96	.95	.95	.95	.94	.95	.95	.96	.97	.97	.97	.97	.98	.98	.98	.97	.97	.98	.97
14	.88	.87	.93	.94	.94	.94	.94	.96	.95	.96	.96	.95	.93	.96	.97	.96	.96	.96	.95	.97	.96	.97	.98	.98	.98	.98	.99	.99	.99	.98	.98	.98	.98
15	.92	.86	.92	.91	.94	.92	.93	.95	.94	.94	.94	.94	.94	.95	.96	.95	.95	.95	.95	.96	.95	.95	.96	.96	.96	.97	.97	.97	.97	.97	.98	.98	.97
16	.93	.87	.94	.92	.95	.92	.92	.95	.96	.95	.95	.94	.93	.95	.96	.95	.95	.95	.94	.95	.95	.96	.97	.97	.97	.97	.98	.98	.98	.97	.97	.97	.97
17	.94	.86	.94	.93	.97	.95	.94	.97	.94	.95	.96	.96	.95	.96	.97	.96	.96	.97	.96	.97	.96	.97	.97	.98	.98	.98	.98	.99	.99	.99	.99	.98	.98
18	.92	.88	.95	.95	.97	.96	.95	.96	.94	.95	.96	.97	.96	.97	.97	.97	.97	.98	.97	.97	.97	.98	.98	.98	.99	.99	.99	.99	.99	.99	.99	.98	.99
19	.92	.87	.93	.93	.96	.93	.93	.96	.96	.97	.97	.96	.95	.97	.97	.96	.95	.96	.95	.96	.96	.97	.98	.98	.99	.98	.99	.99	.99	.99	.98	.98	.99
20	.91	.90	.94	.94	.97	.93	.94	.97	.97	.97	.98	.96	.96	.97	.98	.97	.96	.96	.96	.96	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00

*Underlined values indicate agreement level of .85 or greater.

produce an even more consistent pattern of .85 or above. When the activities of twelve students were cumulated, three days were required for a .85 to be computed. Also, it should be pointed out that after this point, except for a few slight reversals, this level was maintained or increased, both down and across the remaining right side of the matrix. Furthermore, inspection showed that if the matrix were to be triangularly divided from the bottom left to the top right, the lower half of the triangle would contain coefficients .90 or above, except for a few in the low eighties near the upper dividing line of the triangle. In addition, if the acceptance level of agreement were lowered to .80 then, exclusive of the first day, only a few coefficients in the entire matrix would lie below this level. This information provided support for hypothesis III with respect to utilizing the thirty-second time interval to obtain acceptable levels of agreement between observations recorded following Method B and the twenty-day cumulative criterion.

After comparing the thirty-second recordings to the twenty-day every thirty-second cumulative criterion, Scott coefficients were computed for observations made every one minute for thirty minutes for a pe od of twenty days and the same criterion. Examining these coefficients, shown in Table 13, revealed that there is a close similarity to the pattern of coefficients computed for every thirty seconds (Table 12) with respect to the level of agreement of the indices. However, the activities which were recorded every one minute on the first day for sixteen through twenty-three students did attain an acceptable level of agreement when cumulatively totaled and compared to the criterion, but this level was not maintained when additional pupils were added. The thirty-second time interval did not produce any high levels of agreement until the second day. Examining the number of days needed to reach .85 when only student was observed, shows

TABLE 13

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY ONE MINUTE FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days

	Cumulative Number of Students																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.29	.12	.11	.19	.24	.21	.34	.36	.35	.52	.58	.85	.75	.84	.84	.89	.95	.94	.87	.86	.89	.90	.91	.81	.81	.82	.81	.83	.76	.81	.73	.74	.77
2	.09	.53	.48	.63	.75	.69	.70	.64	.61	.63	.62	.77	.88	.87	.86	.92	.89	.90	.92	.90	.91	.86	.86	.90	.89	.89	.88	.92	.92	.92	.91	.91	.92
3	.46	.75	.69	.73	.77	.75	.72	.76	.73	.73	.72	.84	.89	.87	.87	.91	.88	.88	.90	.87	.88	.83	.83	.86	.84	.84	.83	.85	.88	.86	.89	.87	.88
4	.55	.77	.75	.84	.86	.83	.79	.82	.79	.81	.79	.86	.88	.87	.86	.91	.90	.90	.89	.89	.89	.86	.84	.85	.84	.84	.83	.84	.86	.85	.86	.85	.85
5	.66	.71	.64	.75	.81	.83	.82	.83	.80	.83	.80	.83	.88	.82	.83	.85	.84	.84	.87	.85	.85	.82	.81	.82	.80	.81	.80	.81	.83	.83	.84	.83	.83
6	.68	.68	.66	.78	.81	.82	.81	.80	.76	.80	.78	.80	.85	.79	.79	.82	.82	.83	.86	.83	.84	.81	.80	.81	.80	.82	.81	.82	.85	.84	.87	.86	.86
7	.75	.82	.75	.85	.86	.85	.84	.82	.79	.84	.82	.85	.90	.85	.85	.88	.88	.89	.92	.90	.91	.90	.88	.89	.88	.89	.88	.89	.91	.91	.92	.91	.91
8	.80	.91	.86	.91	.94	.94	.93	.92	.89	.91	.91	.92	.96	.92	.91	.93	.95	.95	.98	.96	.96	.96	.94	.94	.93	.92	.93	.94	.95	.95	.96	.95	.95
9	.76	.79	.83	.84	.89	.87	.88	.91	.90	.89	.89	.90	.88	.90	.91	.90	.90	.91	.89	.91	.90	.91	.92	.91	.92	.93	.92	.93	.93	.93	.93	.94	.93
10	.76	.79	.85	.84	.89	.87	.88	.89	.90	.90	.89	.90	.87	.90	.91	.90	.90	.90	.88	.90	.90	.90	.91	.90	.91	.92	.91	.92	.92	.92	.92	.93	.92
11	.79	.83	.89	.90	.92	.89	.90	.92	.93	.91	.91	.92	.89	.91	.93	.92	.92	.92	.90	.92	.92	.92	.93	.93	.93	.94	.94	.94	.94	.91	.94	.94	.94
12	.81	.83	.92	.87	.93	.91	.91	.92	.94	.93	.93	.92	.90	.93	.94	.93	.92	.93	.92	.94	.93	.94	.95	.95	.95	.96	.96	.96	.96	.95	.95	.95	.95
13	.82	.86	.93	.91	.95	.92	.92	.94	.92	.94	.94	.95	.93	.94	.94	.94	.94	.95	.94	.96	.95	.95	.96	.96	.96	.97	.97	.97	.97	.97	.97	.97	.96
14	.85	.88	.93	.93	.94	.93	.93	.94	.93	.95	.94	.95	.94	.95	.95	.95	.95	.96	.95	.97	.96	.96	.97	.97	.97	.98	.98	.98	.98	.98	.97	.97	.98
15	.92	.86	.92	.91	.94	.91	.92	.94	.92	.93	.94	.94	.93	.94	.95	.94	.94	.95	.95	.95	.95	.95	.95	.95	.96	.97	.96	.97	.97	.97	.97	.97	.97
16	.92	.86	.95	.90	.93	.93	.92	.94	.94	.94	.94	.95	.93	.95	.96	.95	.95	.95	.94	.96	.95	.95	.96	.96	.97	.97	.97	.97	.97	.97	.96	.96	.97
17	.91	.85	.94	.91	.85	.95	.95	.95	.93	.94	.95	.96	.95	.95	.96	.95	.96	.97	.96	.97	.97	.97	.97	.97	.98	.98	.98	.98	.98	.98	.98	.98	.98
18	.89	.87	.95	.95	.97	.96	.94	.94	.92	.93	.94	.97	.95	.94	.95	.95	.96	.97	.97	.98	.97	.97	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99
19	.89	.87	.92	.92	.96	.94	.94	.96	.94	.96	.96	.97	.96	.96	.97	.97	.96	.97	.96	.97	.96	.97	.98	.98	.98	.98	.99	.99	.99	.99	.97	.98	.99
20	.91	.92	.94	.94	.97	.95	.95	.96	.94	.96	.97	.98	.97	.96	.97	.97	.98	.98	.97	.98	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.97	.99	1.00

*Underlined values indicate agreement level of .85 or greater.

that fourteen days were required for one minute intervals while only twelve days were necessary for every thirty-second observations.

Exploring further comparisons of Table 12 and Table 13 revealed that the cumulative observations recorded for two and three students every one minute had the same general patterns as the every thirty-second matrix. However, for two students on the ninth day a drop below .85 occurred and continued until the thirteenth day was added which brought the level of agreement up to .86. The pattern for three students differed only slightly. It reached a level of acceptance after eight days (.86) and dropped only once below the acceptance level to .83 after the ninth day. After the tenth day it came back up to .85 and remained at a consistently high level for the remaining period of the study.

Scanning the column which cumulates the activities of thirteen students, revealed that after two days of totaling activities, a coefficient of .88 was attained and an acceptable level was maintained thereafter. However, when another student was added a decrease occurred after the fifth and sixth day's totals were added. If a slightly lower level of agreement of approximately .80 were acceptable, it could be stated that after recording the activities of thirteen students every minute for two days, a representative sampling of the activities of the class of thirty-three students for a period of twenty days was obtained. Actually, the number of acceptable coefficients in the lower triangular matrix were approximately the same as those found in the every thirty-second matrix.

The next interval to be examined and compared with the twenty-day every thirty-second cumulative criterion were the observations made every two minutes on selected individuals. The coefficients resulting from these comparisons are displayed in Table 14. Once

TABLE 14

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY TWO MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.13	.16	.15	.25	.31	.87	.89	.84	.80	.83	.84	.78	.60	.69	.70	.73	.81	.80	.73	.72	.74	.78	.80	.70	.71	.75	.75	.78	.70	.75	.67	.67	.70
2	.07	.50	.50	.65	.76	.84	.87	.85	.80	.76	.74	.85	.86	.88	.87	.93	.93	.92	.91	.90	.90	.89	.88	.88	.88	.89	.89	.91	.90	.90	.89	.88	.89
3	.56	.78	.66	.69	.76	.95	.93	.93	.90	.87	.85	.91	.91	.92	.89	.93	.93	.92	.91	.91	.91	.89	.88	.89	.88	.88	.86	.87	.90	.89	.90	.90	.90
4	.66	.86	.79	.86	.88	.93	.94	.91	.91	.91	.88	.90	.91	.89	.87	.91	.90	.90	.89	.89	.90	.89	.87	.88	.86	.86	.84	.84	.87	.86	.88	.87	.87
5	.73	.74	.69	.80	.84	.95	.93	.90	.93	.93	.90	.90	.91	.88	.87	.90	.90	.90	.90	.88	.88	.85	.84	.85	.83	.83	.82	.83	.85	.85	.86	.85	.85
6	.70	.65	.67	.79	.80	.93	.91	.88	.85	.88	.85	.85	.89	.83	.82	.84	.86	.87	.89	.86	.86	.84	.82	.83	.82	.84	.82	.83	.86	.86	.88	.87	.87
7	.76	.77	.75	.83	.83	.92	.89	.87	.83	.89	.86	.87	.90	.87	.87	.88	.90	.90	.94	.92	.93	.92	.90	.92	.91	.91	.90	.91	.93	.94	.93	.93	.93
8	.89	.85	.85	.93	.90	.94	.94	.95	.91	.94	.93	.95	.95	.92	.92	.92	.94	.95	.98	.97	.98	.98	.96	.96	.94	.94	.94	.95	.96	.96	.96	.96	.95
9	.78	.80	.84	.84	.87	.85	.85	.88	.88	.87	.86	.88	.86	.88	.90	.90	.90	.91	.89	.91	.91	.91	.92	.92	.91	.91	.91	.92	.92	.92	.92	.93	.92
10	.83	.80	.85	.87	.86	.83	.82	.84	.87	.85	.86	.87	.84	.88	.89	.89	.89	.90	.88	.90	.90	.91	.91	.91	.90	.90	.90	.91	.91	.91	.92	.92	.92
11	.88	.84	.85	.89	.88	.86	.86	.89	.89	.88	.88	.89	.86	.90	.91	.91	.90	.91	.90	.92	.92	.93	.94	.93	.92	.92	.93	.93	.93	.94	.93	.94	.93
12	.91	.88	.88	.90	.89	.87	.85	.87	.90	.89	.90	.89	.87	.90	.92	.92	.91	.92	.90	.93	.93	.93	.95	.95	.94	.94	.95	.95	.95	.94	.94	.94	.95
13	.91	.87	.86	.90	.87	.89	.89	.91	.91	.91	.91	.92	.90	.92	.94	.94	.94	.95	.93	.94	.94	.95	.96	.96	.95	.95	.96	.96	.96	.96	.96	.96	.96
14	.90	.89	.85	.90	.87	.91	.91	.93	.93	.93	.92	.93	.91	.94	.95	.95	.95	.96	.95	.96	.96	.96	.97	.97	.97	.97	.97	.98	.98	.97	.97	.97	.98
15	.86	.88	.85	.91	.89	.89	.90	.92	.92	.91	.91	.92	.90	.92	.94	.94	.94	.94	.94	.95	.94	.94	.95	.96	.95	.95	.95	.96	.96	.97	.96	.97	.97
16	.86	.90	.90	.92	.92	.90	.89	.90	.93	.92	.92	.91	.90	.93	.92	.94	.93	.94	.93	.94	.94	.94	.96	.96	.96	.95	.96	.96	.96	.96	.95	.96	.96
17	.87	.92	.93	.94	.92	.93	.92	.94	.93	.93	.93	.94	.93	.94	.95	.95	.95	.96	.95	.96	.96	.96	.97	.97	.97	.97	.97	.98	.98	.98	.97	.98	.98
18	.90	.92	.94	.94	.92	.94	.93	.95	.92	.93	.93	.95	.93	.94	.94	.94	.96	.96	.96	.97	.97	.97	.97	.98	.97	.97	.98	.98	.99	.99	.98	.98	.98
19	.89	.92	.97	.96	.94	.94	.93	.95	.94	.95	.95	.95	.94	.95	.97	.96	.96	.96	.96	.96	.96	.97	.97	.98	.98	.98	.98	.99	.99	.99	.98	.98	.99
20	.85	.95	.94	.95	.94	.95	.94	.96	.95	.96	.96	.96	.95	.96	.97	.96	.97	.98	.97	.97	.97	.98	.98	.99	.99	.98	.99	.99	.99	.99	.98	.99	1.00

*Underlined values indicate agreement level of .85 or greater.

again, as with the one-minute interval comparisons, the pattern of the acceptable level of coefficient (.85 or higher) was almost the same as that of the every thirty-second interval. A consistent level of high coefficients was evident after the eleventh day of recording the activities of one student each day. Nevertheless, there was one striking difference. These coefficients indicated that after the third day of cumulating observations for six students a consistent level of acceptable coefficients was maintained, except for a few scattered slightly low coefficients after the fifth, sixth, seventh, and tenth's days totals were added. Although the thirty-second interval matrix did show this same early effect for six, seven, and eight students, it did not continue as consistently as with the two-minute interval. Also, the two-minute interval indicated that only one student needed to be observed for twelve days to obtain a coefficient of .85 or above. This was one day earlier than the thirty-second interval table showed and two days earlier than the one-minute interval indicated.

Recording observations every four minutes using Method B was the next set of interval recordings compared to the twenty-day every thirty-second cumulative criterion. The results of these computations are shown in Table 15. Scanning these indices revealed that the coefficients above .85 during the first seven days of cumulating were few in number. But when the activities of four students were added after eight days of recording, the pattern of coefficients across that day remained consistently high except for a slight decrease to .84 when the ninth student's activities were added. Furthermore, the coefficients for four students through thirty-three tended to rise to .90 and above after the eighth day's recordings were added and stayed at this level of agreement for the remainder of the study. One conclusion that was drawn was that a few more days of observing are

TABLE 15

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY FOUR MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days

Cumulative Number of Students

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.17	-.09	-.31	-.05	.13	.69	.69	.62	.57	.64	.69	.87	.69	.79	.81	.84	.91	.90	.86	.84	.85	.87	.89	.82	.83	.86	.88	.90	.81	.85	.77	.77	.79
2	-.09	.43	.30	.44	.68	.74	.74	.74	.70	.67	.64	.77	.82	.80	.78	.86	.86	.84	.83	.83	.85	.83	.81	.84	.82	.81	.82	.84	.86	.85	.85	.85	.86
3	.54	.60	.39	.43	.57	.77	.76	.79	.78	.75	.71	.83	.83	.81	.80	.85	.85	.83	.82	.83	.85	.83	.82	.83	.80	.80	.79	.80	.84	.83	.86	.86	.86
4	.73	.90	.66	.67	.72	.84	.82	.81	.82	.82	.78	.84	.85	.81	.81	.85	.85	.82	.82	.83	.86	.85	.82	.83	.80	.80	.79	.78	.81	.82	.84	.84	.85
5	.64	.73	.56	.64	.71	.81	.81	.79	.81	.84	.80	.82	.84	.80	.79	.81	.83	.80	.82	.82	.84	.81	.79	.79	.78	.78	.78	.78	.82	.83	.84	.84	.84
6	.74	.58	.57	.69	.71	.80	.80	.77	.76	.81	.78	.80	.83	.78	.77	.79	.81	.79	.82	.81	.82	.80	.78	.79	.78	.78	.77	.78	.82	.82	.84	.84	.84
7	.80	.67	.64	.76	.78	.81	.83	.78	.76	.83	.81	.83	.88	.83	.83	.84	.85	.84	.86	.87	.88	.88	.83	.87	.85	.84	.84	.85	.88	.89	.90	.90	.90
8	.90	.75	.76	.89	.88	.90	.89	.87	.84	.88	.89	.90	.94	.88	.88	.89	.90	.89	.92	.91	.92	.93	.91	.91	.89	.88	.88	.90	.91	.92	.93	.93	.92
9	.82	.83	.88	.89	.92	.91	.91	.94	.91	.92	.90	.91	.89	.92	.93	.93	.93	.94	.93	.95	.94	.93	.94	.93	.94	.94	.94	.94	.94	.94	.95	.95	.95
10	.86	.86	.83	.92	.96	.90	.88	.93	.92	.90	.89	.90	.88	.91	.93	.91	.91	.93	.91	.93	.92	.92	.92	.91	.92	.92	.92	.92	.92	.93	.93	.94	.93
11	.83	.88	.88	.93	.96	.93	.91	.95	.94	.91	.91	.90	.87	.92	.93	.92	.91	.93	.91	.94	.93	.94	.95	.94	.94	.94	.94	.94	.94	.95	.95	.95	.95
12	.86	.91	.96	.93	.90	.93	.94	.91	.93	.91	.93	.91	.88	.92	.94	.93	.92	.94	.92	.95	.95	.96	.96	.95	.96	.96	.96	.96	.96	.96	.96	.96	.96
13	.91	.91	.90	.92	.93	.95	.94	.96	.93	.95	.94	.94	.92	.95	.95	.94	.96	.96	.96	.98	.97	.97	.96	.97	.97	.98	.97	.97	.97	.98	.98	.98	.97
14	.89	.94	.90	.93	.92	.96	.95	.96	.95	.95	.95	.94	.96	.96	.96	.95	.96	.96	.96	.97	.97	.98	.96	.97	.99	.99	.98	.98	.98	.99	.98	.98	.98
15	.88	.91	.90	.92	.94	.95	.93	.95	.94	.93	.93	.93	.91	.95	.96	.95	.95	.96	.95	.96	.96	.96	.97	.96	.97	.97	.98	.98	.98	.98	.97	.98	.98
16	.86	.93	.92	.93	.95	.95	.92	.95	.94	.93	.94	.93	.91	.94	.96	.95	.94	.95	.94	.95	.94	.96	.97	.97	.97	.97	.98	.98	.98	.97	.96	.97	.97
17	.85	.95	.93	.92	.93	.95	.95	.95	.92	.93	.94	.95	.94	.95	.94	.94	.95	.94	.95	.97	.97	.96	.95	.96	.97	.97	.97	.97	.97	.98	.98	.98	.97
18	.83	.95	.94	.92	.92	.95	.95	.94	.91	.92	.93	.95	.94	.93	.93	.93	.94	.93	.94	.96	.96	.96	.94	.95	.96	.97	.97	.96	.96	.97	.98	.97	.97
19	.85	.96	.95	.94	.93	.96	.95	.96	.92	.94	.95	.96	.95	.95	.95	.95	.96	.95	.96	.97	.97	.97	.95	.96	.96	.97	.97	.97	.96	.95	.98	.97	.97
20	.86	.93	.95	.93	.91	.97	.95	.96	.93	.94	.95	.97	.96	.95	.95	.94	.96	.95	.96	.97	.97	.97	.96	.95	.96	.96	.97	.97	.97	.96	.97	.98	.97	.97

*Underlined values indicate agreement level of .85 or greater.

necessary if a four-minute interval is employed rather than a smaller time interval.

Continuing the testing of hypothesis III to determine whether acceptable levels of agreement are attained between observations recorded at various time intervals and the twenty-day every thirty-second cumulative criterion, the next time interval to be explored for recording pupil activities in the classroom was the six-minute interval. These indices are shown in Table 16. When one student was observed each day, the acceptance level was never attained. However, when two students were observed for sixteen days, a .85 was obtained and consistently increased for the following days. Also, it was necessary to follow the activities of eleven students every six minutes for ten days to achieve and maintain a level of acceptance. Furthermore, during the first eight days of recording, the acceptance level of agreement was never consistently reached and it was necessary to record the activities of nineteen pupils to attain it on the ninth day. About one half of the coefficients in Table 16 are below the acceptance level of .85 and about the same number are below .80.

The next interval to be examined was the eight-minute time interval. The indices which resulted from comparing the data with the twenty-day every thirty-second cumulative criterion are shown in Table 17. It appeared that there was a slightly larger number of coefficients attaining .85 or above than with the every six-minute interval (Table 16). Three pupils were needed to be observed for sixteen days before the coefficients were consistently high. However, observing five students for eight to ten days did produce almost consistently high levels. On approximately the seventh day, the coefficients began to increase to .80 or above. Also, seven days

TABLE 16

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY SIX MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.47	-.71	-.32	-.14	.03	.09	.28	.31	.32	.51	.59	.78	.68	.73	.77	.77	.80	.79	.72	.71	.74	.80	.78	.68	.70	.75	.77	.78	.70	.74	.66	.68	.72
2	-.47	-.05	.09	.16	.42	.43	.42	.42	.43	.47	.46	.61	.79	.76	.74	.80	.72	.72	.74	.74	.75	.72	.75	.78	.77	.74	.74	.76	.79	.77	.79	.78	.76
3	.16	.09	.06	.22	.42	.54	.54	.57	.53	.55	.54	.66	.79	.74	.76	.77	.72	.72	.74	.73	.75	.71	.73	.74	.72	.70	.69	.69	.73	.71	.72	.72	.72
4	.45	.42	.40	.48	.62	.69	.67	.67	.63	.68	.66	.72	.82	.77	.76	.74	.69	.68	.69	.69	.73	.71	.72	.72	.69	.69	.69	.69	.72	.71	.71	.71	.71
5	.44	.31	.40	.44	.59	.68	.61	.69	.66	.72	.70	.72	.78	.73	.73	.71	.70	.68	.69	.69	.71	.70	.71	.70	.69	.69	.69	.69	.73	.73	.72	.71	.71
6	.26	.13	.34	.41	.51	.61	.60	.57	.56	.63	.62	.64	.70	.65	.65	.64	.63	.64	.67	.70	.67	.67	.67	.67	.66	.69	.69	.69	.72	.72	.72	.72	.72
7	.56	.43	.46	.52	.58	.61	.60	.59	.57	.67	.67	.69	.75	.72	.67	.71	.70	.70	.74	.74	.75	.76	.76	.77	.75	.76	.77	.77	.80	.80	.79	.79	.79
8	.55	.44	.54	.58	.66	.69	.68	.70	.70	.75	.78	.78	.83	.79	.72	.77	.76	.76	.80	.80	.84	.82	.82	.81	.80	.82	.82	.82	.85	.85	.85	.84	.84
9	.57	.52	.63	.60	.66	.71	.70	.72	.74	.79	.81	.83	.86	.84	.84	.83	.84	.84	.87	.88	.88	.87	.88	.88	.88	.90	.89	.89	.91	.92	.92	.91	.90
10	.64	.57	.65	.65	.72	.76	.76	.78	.79	.84	.86	.87	.89	.87	.87	.85	.86	.86	.88	.89	.89	.88	.88	.88	.88	.90	.90	.90	.92	.92	.92	.89	.90
11	.68	.64	.69	.66	.76	.81	.80	.80	.82	.70	.91	.93	.91	.92	.91	.89	.90	.90	.91	.92	.93	.92	.92	.92	.92	.94	.94	.94	.95	.95	.94	.94	.93
12	.65	.70	.75	.74	.80	.83	.85	.86	.87	.92	.92	.94	.93	.93	.92	.90	.92	.91	.93	.94	.94	.92	.92	.93	.93	.95	.94	.95	.95	.95	.94	.94	.93
13	.68	.70	.76	.72	.78	.80	.83	.84	.83	.89	.90	.92	.93	.91	.89	.88	.89	.88	.90	.91	.92	.92	.91	.92	.92	.94	.93	.92	.93	.93	.92	.92	.91
14	.75	.77	.76	.76	.80	.81	.82	.84	.84	.89	.90	.93	.93	.91	.89	.88	.89	.88	.90	.91	.92	.92	.91	.92	.92	.94	.94	.93	.93	.93	.92	.92	.91
15	.78	.81	.82	.81	.86	.85	.85	.86	.86	.89	.89	.91	.92	.92	.90	.90	.90	.91	.92	.94	.92	.94	.93	.93	.92	.96	.94	.95	.93	.95	.92	.94	.91
16	.77	.85	.87	.85	.88	.89	.88	.88	.88	.90	.89	.92	.92	.93	.91	.91	.91	.93	.92	.95	.94	.95	.92	.95	.95	.97	.97	.96	.96	.96	.96	.95	.94
17	.83	.88	.90	.85	.87	.87	.86	.86	.87	.89	.89	.91	.92	.91	.91	.90	.91	.93	.92	.94	.94	.94	.93	.94	.94	.95	.95	.94	.93	.93	.93	.92	.92
18	.84	.90	.89	.85	.86	.87	.80	.84	.86	.88	.88	.90	.90	.90	.89	.90	.91	.91	.92	.94	.94	.94	.93	.94	.94	.95	.94	.94	.93	.92	.92	.92	.91
19	.82	.92	.92	.87	.89	.91	.88	.87	.88	.90	.91	.92	.92	.92	.92	.92	.94	.94	.94	.95	.95	.95	.94	.95	.94	.95	.94	.94	.93	.93	.92	.92	.91
20	.76	.91	.91	.89	.94	.91	.90	.89	.88	.91	.91	.92	.92	.92	.91	.91	.92	.92	.92	.94	.94	.93	.93	.93	.93	.94	.93	.93	.92	.92	.91	.91	.90

*Underlined values indicate agreement level of .85 or greater.

TABLE 17

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY EIGHT MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.56	-.38	-.54	-.64	.01	-.11	.00	.08	.14	.32	.46	.74	.83	.86	.85	.90	.83	.82	.87	.85	.84	.79	.78	.84	.83	.82	.82	.85	.84	.83	.81	.79	.81
2	.22	.67	.48	.36	.72	.57	.57	.51	.52	.53	.54	.69	.82	.79	.79	.81	.80	.76	.78	.72	.71	.69	.69	.73	.71	.70	.72	.75	.78	.75	.77	.76	.76
3	.53	.66	.39	.31	.62	.63	.59	.64	.61	.61	.61	.73	.81	.76	.78	.80	.77	.74	.77	.71	.73	.69	.69	.70	.67	.67	.68	.69	.73	.71	.73	.74	.74
4	.51	.28	.67	.61	.75	.74	.66	.66	.60	.69	.66	.71	.79	.73	.64	.75	.75	.71	.74	.70	.75	.72	.71	.72	.69	.71	.70	.70	.73	.73	.76	.77	.77
5	.63	.71	.56	.59	.74	.76	.78	.74	.72	.83	.80	.81	.86	.81	.81	.80	.82	.77	.80	.77	.80	.78	.76	.77	.76	.78	.78	.78	.82	.83	.83	.84	.84
6	.58	.63	.58	.63	.79	.80	.79	.76	.73	.86	.84	.85	.88	.85	.84	.84	.86	.81	.84	.81	.82	.80	.79	.80	.79	.80	.79	.80	.83	.83	.83	.83	.83
7	.66	.78	.69	.69	.87	.84	.84	.76	.74	.85	.83	.84	.90	.85	.86	.84	.86	.82	.85	.84	.85	.86	.84	.86	.84	.84	.84	.85	.87	.86	.86	.86	.86
8	.71	.74	.69	.74	.89	.86	.87	.83	.81	.89	.91	.90	.94	.90	.91	.90	.92	.90	.93	.92	.93	.93	.91	.92	.90	.91	.90	.92	.94	.94	.93	.93	.93
9	.67	.67	.71	.75	.85	.85	.85	.84	.82	.84	.84	.85	.83	.85	.88	.89	.88	.90	.90	.91	.90	.90	.91	.89	.91	.91	.92	.92	.92	.93	.93	.94	.94
10	.72	.73	.68	.78	.87	.87	.87	.88	.85	.85	.85	.86	.82	.86	.89	.89	.89	.90	.89	.91	.91	.91	.91	.89	.90	.91	.91	.92	.91	.91	.92	.92	.93
11	.76	.78	.72	.77	.90	.89	.89	.90	.88	.86	.86	.85	.81	.86	.87	.88	.86	.89	.88	.90	.90	.91	.93	.91	.91	.90	.92	.92	.91	.92	.92	.92	.92
12	.79	.82	.77	.81	.90	.88	.89	.90	.88	.87	.88	.87	.83	.88	.88	.90	.88	.90	.89	.92	.92	.94	.95	.94	.94	.93	.94	.94	.94	.93	.94	.94	.95
13	.71	.88	.77	.81	.89	.86	.89	.88	.85	.89	.89	.90	.88	.91	.93	.93	.93	.94	.93	.95	.95	.96	.95	.95	.96	.96	.96	.97	.96	.97	.96	.96	.96
14	.71	.85	.80	.82	.91	.89	.91	.90	.86	.89	.89	.91	.89	.92	.93	.94	.93	.95	.93	.95	.96	.95	.96	.96	.96	.97	.97	.97	.96	.96	.96	.96	.96
15	.70	.84	.84	.87	.92	.91	.91	.93	.89	.88	.89	.90	.87	.91	.91	.92	.90	.93	.91	.92	.92	.94	.95	.94	.94	.94	.95	.96	.96	.96	.96	.96	.97
16	.75	.83	.89	.89	.92	.92	.93	.94	.90	.90	.90	.91	.87	.91	.91	.92	.90	.93	.91	.92	.92	.94	.95	.94	.94	.94	.95	.96	.96	.96	.95	.96	.97
17	.79	.81	.87	.86	.92	.94	.93	.92	.88	.91	.92	.93	.90	.93	.94	.95	.93	.95	.94	.95	.95	.96	.96	.97	.97	.97	.97	.97	.97	.97	.96	.96	.97
18	.84	.79	.88	.87	.92	.93	.92	.90	.87	.91	.91	.93	.95	.93	.94	.94	.94	.95	.95	.95	.95	.96	.95	.96	.97	.97	.97	.97	.96	.96	.96	.95	.95
19	.86	.81	.91	.87	.92	.93	.91	.89	.92	.91	.92	.94	.92	.94	.95	.95	.95	.95	.95	.96	.96	.96	.95	.96	.96	.97	.96	.96	.95	.95	.96	.95	.95
20	.85	.83	.94	.89	.92	.94	.92	.90	.87	.94	.94	.95	.94	.94	.95	.95	.95	.96	.95	.97	.97	.96	.94	.96	.96	.96	.96	.96	.95	.95	.96	.95	.95

*Underlined values indicate agreement level of .85 or greater.

were required before .85 or above was obtained when the activities of thirty-three students were compared to the twenty-day every thirty-second criterion which was two days sooner than when the six-minute interval was utilized.

Further exploration of increasing the time interval for recording the activities of pupils led to examining the ten-minute interval. The observations were for a daily thirty-minute observation period over a period of twenty days. Table 18 presents the resulting coefficients obtained by comparing the ten-minute interval data with the twenty-day every thirty-second cumulative criterion. The number of indices attaining acceptance level of .85 was approximately the same as with the eight-minute interval except that a few more days and students were required to maintain consistent levels. Three students were required to be observed for seventeen days to achieve a rather stable level. Thirty students required four days to reach a level of agreement of .85 or above. When the time period was shortened to eight days, the number of students needed was increased to nineteen. Four days were required to meet the acceptance level of agreement when all thirty-three students were observed. Once again, as with the eight-minute recording interval, approximately one-half of the coefficients reached the acceptance level of agreement.

The twelve-minute recording interval was the next interval utilized to test hypothesis III. With this interval, as shown in Table 19, six students were required to be observed each day through twenty days before a .85 level of agreement was reached. The coefficients in Table 19 do not show high agreement until the eighth day except for a few indices on the first day. Although once agreement was reached for a specified number of days or students, it was maintained. The recordings of twelve students showed consistency on the ninth day

TABLE 18

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY TEN MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.28	-.54	-.68	-.18	-.19	.03	-.09	.28	.36	.43	.33	.64	.71	.71	.71	.80	.79	.78	.79	.77	.82	.83	.83	.77	.78	.81	.86	.91	.82	.82	.78	.78	.81
2	-.54	-.18	-.06	.28	.58	.53	.37	.45	.68	.63	.51	.66	.77	.69	.65	.80	.72	.64	.65	.66	.71	.71	.72	.75	.76	.79	.79	.79	.82	.82	.84	.84	.82
3	.35	.53	.34	.51	.62	.60	.52	.52	.68	.70	.62	.72	.76	.68	.68	.78	.73	.70	.69	.70	.75	.76	.76	.76	.77	.80	.79	.77	.82	.83	.84	.84	.84
4	.50	.87	.73	.87	.88	.85	.76	.72	.84	.87	.80	.83	.84	.78	.74	.81	.78	.72	.73	.75	.70	.80	.80	.80	.82	.84	.82	.79	.83	.85	.86	.87	.86
5	.84	.65	.67	.86	.78	.81	.72	.68	.78	.84	.76	.76	.77	.71	.66	.75	.76	.72	.75	.77	.79	.78	.76	.79	.81	.84	.81	.80	.84	.86	.88	.87	.87
6	.87	.65	.69	.84	.72	.76	.66	.61	.68	.77	.71	.72	.73	.68	.65	.72	.72	.71	.75	.76	.77	.76	.74	.75	.78	.82	.80	.80	.83	.86	.88	.87	.86
7	.71	.74	.71	.84	.71	.76	.69	.65	.69	.77	.70	.73	.76	.74	.70	.75	.75	.74	.80	.80	.81	.80	.78	.80	.82	.85	.83	.83	.87	.89	.90	.89	.89
8	.73	.80	.77	.88	.77	.79	.75	.75	.78	.83	.82	.82	.82	.79	.76	.80	.81	.80	.85	.86	.86	.86	.83	.84	.86	.87	.86	.87	.90	.91	.92	.92	.91
9	.68	.67	.70	.82	.77	.77	.75	.83	.80	.81	.78	.80	.82	.80	.78	.80	.82	.82	.86	.88	.88	.86	.84	.85	.87	.89	.88	.89	.91	.92	.94	.94	.93
10	.70	.67	.73	.82	.79	.78	.81	.81	.81	.87	.83	.86	.88	.86	.84	.85	.87	.87	.90	.91	.90	.88	.86	.87	.89	.91	.89	.90	.92	.93	.94	.94	.94
11	.72	.70	.78	.85	.82	.81	.85	.83	.82	.89	.84	.75	.89	.87	.85	.85	.87	.88	.90	.91	.90	.89	.86	.88	.89	.91	.90	.91	.92	.94	.95	.94	.93
12	.84	.73	.81	.86	.85	.86	.84	.83	.81	.87	.82	.86	.89	.88	.86	.87	.88	.87	.91	.92	.90	.89	.86	.88	.89	.90	.89	.90	.91	.93	.93	.93	.92
13	.80	.73	.78	.88	.86	.85	.86	.83	.81	.88	.83	.88	.89	.87	.85	.86	.87	.87	.90	.91	.90	.89	.87	.88	.89	.91	.90	.90	.91	.92	.92	.92	.91
14	.81	.73	.79	.91	.83	.84	.84	.84	.80	.86	.81	.85	.86	.84	.82	.83	.84	.84	.87	.88	.87	.86	.84	.85	.87	.89	.87	.87	.88	.89	.90	.89	.89
15	.82	.73	.80	.87	.87	.87	.89	.86	.84	.88	.84	.89	.89	.87	.85	.85	.87	.87	.89	.91	.90	.89	.81	.88	.90	.92	.90	.90	.91	.92	.93	.93	.93
16	.91	.77	.84	.93	.89	.89	.89	.85	.84	.88	.84	.89	.88	.87	.85	.86	.88	.87	.90	.92	.92	.90	.88	.90	.91	.92	.91	.90	.91	.92	.94	.93	.93
17	.90	.80	.87	.94	.89	.88	.88	.84	.84	.87	.82	.87	.86	.85	.83	.84	.85	.87	.88	.90	.90	.88	.86	.88	.89	.90	.89	.89	.89	.90	.91	.91	.91
18	.85	.81	.87	.94	.91	.90	.89	.84	.84	.88	.84	.87	.86	.86	.84	.85	.86	.87	.89	.91	.90	.89	.86	.88	.89	.90	.90	.89	.89	.89	.91	.91	.90
19	.78	.76	.89	.91	.95	.95	.83	.89	.89	.92	.89	.92	.90	.90	.89	.89	.90	.91	.92	.91	.92	.91	.89	.91	.92	.93	.91	.91	.90	.91	.93	.92	.90
20	.84	.81	.89	.95	.92	.94	.93	.88	.89	.93	.90	.92	.90	.90	.89	.88	.87	.90	.91	.93	.92	.91	.88	.90	.91	.87	.91	.91	.90	.91	.93	.92	.91

*Underlined values indicate agreement level of .85 or greater.

TABLE 19

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY TWELVE MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-1.33	-1.33	-1.33	-1.33	-.32	-.42	-.17	.06	.18	.43	.48	.76	.78	.81	.80	.88	.87	.86	.85	.83	.82	.83	.83	.77	.78	.82	.81	.85	.78	.82	.74	.74	.78
2	-1.33	-.56	-.79	-.56	.05	.10	.12	.15	.27	.35	.33	.52	.62	.60	.62	.69	.67	.64	.66	.64	.63	.61	.63	.68	.66	.64	.66	.67	.70	.69	.72	.73	.72
3	-1.33	-.79	-.95	-.54	-.05	.13	.12	.16	.31	.38	.40	.54	.66	.62	.67	.70	.69	.65	.67	.65	.66	.64	.65	.67	.64	.62	.62	.61	.66	.64	.65	.66	.65
4	-.56	.03	-.15	.14	.30	.41	.37	.46	.50	.63	.63	.69	.80	.74	.78	.78	.77	.74	.75	.73	.73	.71	.71	.72	.70	.70	.68	.67	.70	.69	.70	.72	.72
5	-.69	-.18	-.18	.12	.36	.46	.48	.53	.54	.68	.66	.69	.76	.72	.73	.73	.73	.70	.71	.70	.69	.68	.68	.69	.69	.70	.69	.68	.72	.72	.72	.73	.74
6	-.79	-.34	-.09	.19	.35	.40	.40	.46	.49	.62	.63	.66	.73	.68	.68	.69	.72	.68	.72	.70	.68	.68	.68	.70	.71	.74	.73	.73	.76	.75	.76	.76	.76
7	-.47	.03	.08	.30	.43	.44	.44	.47	.52	.65	.68	.71	.79	.74	.75	.75	.77	.74	.79	.78	.77	.77	.77	.79	.79	.80	.79	.79	.83	.83	.82	.82	.82
8	-.23	-.01	.11	.39	.49	.50	.50	.55	.61	.71	.77	.78	.84	.79	.79	.79	.80	.77	.82	.81	.80	.81	.81	.82	.81	.84	.84	.84	.87	.87	.87	.87	.87
9	.03	.24	.32	.46	.53	.58	.56	.63	.72	.81	.84	.87	.91	.87	.87	.87	.90	.88	.90	.91	.89	.88	.89	.89	.88	.91	.90	.90	.92	.92	.92	.91	.90
10	.12	.33	.35	.49	.59	.65	.64	.72	.78	.86	.89	.91	.94	.90	.90	.89	.92	.90	.92	.93	.90	.88	.89	.90	.90	.92	.92	.92	.94	.94	.94	.94	.93
11	.26	.46	.48	.57	.67	.74	.74	.79	.84	.90	.91	.93	.88	.93	.94	.95	.93	.96	.95	.95	.97	.95	.95	.94	.94	.92	.93	.94	.93	.93	.93	.93	.94
12	.26	.54	.57	.63	.68	.72	.74	.80	.84	.92	.94	.96	.94	.96	.95	.94	.97	.94	.95	.96	.93	.92	.92	.93	.93	.95	.94	.94	.95	.95	.94	.94	.93
13	.21	.47	.54	.60	.66	.69	.72	.76	.78	.87	.90	.93	.95	.92	.90	.88	.91	.89	.90	.91	.90	.89	.89	.89	.90	.92	.91	.91	.91	.91	.91	.91	.90
14	.38	.63	.62	.65	.67	.71	.73	.77	.80	.87	.90	.92	.93	.91	.90	.89	.91	.90	.91	.91	.90	.89	.89	.89	.90	.92	.91	.90	.91	.91	.91	.91	.90
15	.41	.66	.65	.70	.73	.74	.76	.81	.83	.88	.91	.93	.92	.93	.93	.92	.94	.92	.93	.95	.94	.93	.92	.93	.93	.95	.95	.94	.94	.94	.95	.94	.94
16	.44	.69	.71	.73	.74	.77	.78	.83	.84	.89	.91	.93	.91	.93	.94	.93	.95	.95	.95	.96	.95	.94	.93	.94	.95	.96	.96	.95	.96	.96	.96	.96	.95
17	.47	.71	.73	.73	.71	.75	.75	.79	.81	.86	.87	.81	.92	.92	.92	.91	.92	.92	.92	.94	.93	.91	.91	.92	.93	.94	.94	.93	.93	.93	.94	.93	.92
18	.66	.77	.76	.75	.74	.77	.76	.79	.82	.86	.87	.90	.91	.91	.91	.91	.92	.92	.92	.94	.93	.92	.91	.93	.94	.94	.94	.93	.93	.93	.94	.93	.93
19	.62	.79	.81	.78	.77	.83	.82	.83	.86	.90	.91	.93	.94	.94	.94	.94	.93	.95	.95	.94	.96	.94	.93	.92	.93	.93	.94	.94	.93	.92	.92	.90	.93	.92
20	.61	.80	.82	.79	.78	.85	.85	.85	.87	.91	.92	.94	.94	.94	.94	.94	.95	.94	.94	.96	.94	.93	.92	.92	.92	.94	.93	.92	.91	.92	.93	.92	.91

*Underlined values indicate agreement level of .85 or greater.

while ten days were required for ten students. During the first seven days of recording, the agreement indices computed were consistently below .80. However, once an acceptable level of agreement was reached, the coefficients were usually above .90 rather than lying between .85 and .90.

The last interval to be explored was the fourteen-minute recording interval. Shown in Table 20 are the coefficients which resulted from comparing this interval with the twenty-day cumulative criterion. This interval yielded acceptable coefficients sooner than the twelve-minute interval did. Consistently high coefficients were evident after eight days of observing eighteen students. When the student number was decreased to six students, eleven days produced acceptable indices of agreement of .85 or higher. A further decrease in student number to three required an increase in the number of days to fifteen. While less than one-half of the coefficients yielded for the twelve-minute recording interval reached an acceptable level of agreement, more than one-half of the indices for the fourteen minute recording interval did attain a .85 or higher. It was concluded that for this study the fourteen-minute recording interval is more representative of the cumulative criterion than the twelve-minute recording interval.

As a result of the analyses of the data yielded by varying the time interval, it was concluded that when the thirty-second, one-minute or two-minute time interval is utilized that hypothesis III is strongly supported. Hypothesis III states that the acceptable level of agreement is attained between the cumulative measurement obtained by Method B at each given time interval for a sampling of pupils for thirty minutes for one through twenty days and Criterion I. Acceptable levels of agreement were attained between the thirty-second, one-minute, and two-minute time intervals and the twenty-day criterion,

TABLE 20

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY FOURTEEN MINUTES FOR THIRTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Cumulative Number of Students																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	.55	.55	.32	.46	.43	.67	.71	.71	.71	.63	.77	.58	.43	.53	.55	.58	.66	.68	.68	.68	.68	.71	.72	.62	.63	.69	.69	.74	.66	.70	.63	.63	.63
2	.01	.01	-.35	.24	.55	.66	.63	.63	.62	.69	.71	73	.82	.80	.79	.84	.83	.82	.81	.80	.78	.80	.79	.79	.77	.77	.76	.78	.77	.77	.76	.78	.79
3	.32	.01	.13	.33	.55	.76	.77	.72	.74	.75	.76	.84	.91	.84	.84	.87	.84	.84	.82	.79	.80	.79	.75	.78	.75	.73	.74	.76	.72	.82	.85	.86	.86
4	.55	.66	.61	.72	.69	.84	.87	.84	.80	.86	.84	.89	.90	.87	.89	.87	.87	.89	.85	.82	.86	.84	.80	.81	.79	.77	.76	.77	.80	.82	.85	.85	.76
5	.53	.39	.70	.76	.80	.83	.83	.80	.80	.86	.88	.85	.89	.89	.87	.87	.86	.89	.86	.84	.87	.85	.81	.83	.83	.81	.80	.79	.83	.85	.86	.86	.86
6	.32	.18	.68	.73	.72	.78	.78	.76	.73	.77	.76	.76	.79	.76	.73	.75	.76	.80	.80	.78	.82	.80	.76	.79	.80	.80	.79	.78	.81	.83	.84	.85	.86
7	.40	.41	.74	.75	.79	.79	.78	.75	.75	.80	.79	.79	.82	.80	.79	.79	.79	.83	.83	.84	.85	.85	.84	.83	.82	.83	.84	.84	.84	.84	.84	.86	.86
8	.66	.44	.72	.81	.83	.84	.83	.82	.80	.85	.86	.85	.87	.85	.83	.83	.83	.86	.86	.87	.88	.88	.87	.86	.86	.86	.87	.87	.86	.87	.87	.89	.86
9	.68	.60	.76	.86	.85	.85	.86	.86	.87	.89	.90	.88	.87	.92	.91	.92	.92	.94	.92	.94	.92	.93	.96	.94	.95	.94	.95	.95	.95	.94	.93	.94	.94
10	.69	.66	.75	.85	.87	.82	.84	.82	.88	.87	.89	.88	.86	.91	.93	.94	.93	.92	.90	.92	.91	.92	.96	.94	.94	.93	.95	.95	.94	.93	.93	.95	.94
11	.67	.69	.73	.81	.84	.88	.88	.89	.86	.88	.89	.91	.91	.93	.92	.91	.93	.95	.94	.97	.95	.95	.97	.96	.97	.96	.97	.97	.96	.95	.95	.97	.96
12	.67	.78	.78	.84	.84	.89	.89	.91	.89	.89	.90	.92	.89	.94	.94	.93	.94	.93	.93	.95	.94	.94	.98	.97	.97	.96	.97	.98	.97	.96	.96	.97	.97
13	.71	.79	.78	.83	.81	.89	.90	.92	.89	.88	.89	.93	.94	.94	.93	.91	.92	.95	.96	.97	.98	.98	.97	.97	.97	98	.97	.97	.97	98	.98	.98	.98
14	.69	.81	.80	.82	.81	.90	.91	.93	.89	.90	.90	.94	.96	.94	.93	.91	.92	.94	.95	.96	.98	.98	.95	.95	.96	.97	.95	.94	.95	.96	.96	.92	.94
15	.69	.87	.87	.89	.90	.90	.92	.91	.94	.93	.94	.93	.90	.94	.97	.95	.96	.96	.95	.96	.95	.95	.98	.98	.99	.98	.98	.98	.98	.98	.98	.98	.99
16	.69	.84	.86	.89	.91	.88	.89	.90	.93	.92	.94	.91	.89	.92	.94	.95	.94	.93	.92	.94	.93	.93	.96	.96	.96	.95	.97	.98	.97	.95	.96	.98	.98
17	.68	.84	.89	.90	.90	.91	.91	.93	.93	.92	.94	.94	.91	.94	.96	.95	.95	.96	.95	.96	.95	.96	.97	.98	.97	.97	.97	.97	.97	97	.97	.98	.98
18	.68	.82	.88	.89	.91	.89	.90	.92	.92	.93	.95	.93	.91	.94	.95	.96	.95	.95	.94	.96	.95	.95	.97	.97	.97	.96	.97	.97	.97	.97	.97	.98	.98
19	.68	.81	.87	.90	.93	.88	.88	.91	.93	.93	.96	.93	.92	.93	.94	.95	.95	.94	.94	.95	.94	.95	.97	.97	.97	.96	.97	.97	.96	.96	.97	.97	.98
20	.67	.83	.88	.91	.92	.90	.90	.93	.93	.93	.96	.95	.94	.95	.96	.96	.96	.96	.96	.97	.97	.97	.97	.98	.97	.96	.97	.96	.96	.96	.96	.96	.97

*Underlined values indicate agreement level of .85 or greater.

Criterion I, even when only a few students were observed and the observation period lasted only a few days. When the four-minute time interval was employed, there was an increase in the number of students and days required to attain a consistent .85 level of agreement. Therefore, it was concluded that utilization of the four-minute time interval moderately supports hypothesis III. When the 6, 8, 10, 12, and 14 minute time intervals were employed, the number of students and days required to attain an acceptance level of .85 increased considerably. It was, therefore, concluded that these time intervals show weak support for hypothesis III for attaining acceptable levels of agreement.

The Number of Days Required to Obtain an Adequate Criterion Measure

Although no hypotheses were formed concerning the level of agreement between observations obtained by either Method A or Method B for a given number of days and a daily cumulative criterion for the same number of days, it was an aspect of sampling which was considered necessary to investigate in order to establish that twenty days was a sufficient period of time for collecting criterion data. Table 21 shows the levels of agreement computed between observations for a given number of days and a daily cumulative criterion for the same number of days. It was expected that after a period of time the percentage of frequencies cumulated in each of the observation categories would become stabilized indicating that additional data were not required. However, until this stable point was attained, the resulting coefficients of agreement would show fluctuation both in the positive and negative direction when compared to the coefficients given in Table 12 for the same observations and the twenty-day cumulative criterion. If no fluctuation or a stable point was attained before the twentieth day of cumulating daily

TABLE 21

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY THIRTY SECONDS FOR THIRTY MINUTES AND THE EVERY THIRTY-SECONDS CUMULATIVE CRITERION FOR THE SAME NUMBER OF DAYS*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.35	-.07	-.20	-.11	-.06	.46	.49	.45	.42	.54	.57	.79	.86	.89	.88	.95	.88	.87	.93	.93	.90	.84	.82	.92	.91	.90	.91	.91	.96	.96	.95	.97	1.00
2	.01	.48	.38	.55	.65	.87	.86	.78	.74	.75	.73	.86	.90	.93	.93	.97	.96	.96	.97	.98	.97	.96	.91	.95	.94	.93	.93	.95	.99	.98	.97	.99	1.00
3	.39	.72	.70	.75	.79	.95	.91	.93	.88	.87	.86	.94	.91	.95	.94	.94	.97	.97	.96	.95	.95	.96	.96	.96	.96	.96	.95	.96	.98	.98	.98	.99	1.00
4	.49	.76	.84	.90	.93	.90	.95	.94	.95	.94	.96	.93	.91	.94	.93	.93	.94	.94	.92	.93	.91	.95	.96	.95	.97	.98	.97	.98	.98	.99	.98	.99	1.00
5	.64	.81	.76	.85	.91	.93	.95	.94	.96	.94	.96	.95	.94	.94	.94	.96	.96	.96	.94	.95	.94	.96	.97	.97	.98	.98	.97	.98	.98	.99	.99	.99	1.00
6	.69	.81	.78	.88	.92	.96	.98	.96	.92	.97	.94	.95	.95	.93	.93	.95	.97	.98	.97	.98	.97	.97	.95	.96	.95	.96	.95	.97	.99	.99	.98	.99	1.00
7	.76	.88	.80	.90	.91	.97	.96	.93	.89	.94	.92	.94	.96	.93	.93	.95	.96	.98	.97	.97	.97	.97	.97	.96	.97	.96	.96	.97	.98	.99	.99	1.00	1.00
8	.83	.91	.87	.93	.94	.95	.94	.94	.91	.94	.95	.96	.96	.94	.93	.94	.95	.96	.94	.96	.96	.96	.97	.98	.98	.98	.97	.97	.98	.99	.98	.99	1.00
9	.83	.84	.88	.90	.94	.90	.91	.93	.94	.93	.94	.92	.91	.94	.95	.94	.93	.93	.92	.94	.94	.95	.97	.98	.98	.98	.98	.98	.98	.99	.98	.99	1.00
10	.81	.85	.90	.90	.94	.90	.90	.92	.95	.92	.94	.92	.90	.93	.95	.94	.93	.93	.91	.94	.94	.95	.97	.98	.98	.98	.98	.99	.98	.98	.98	.99	1.00
11	.81	.87	.92	.95	.94	.94	.93	.96	.94	.95	.96	.94	.92	.95	.96	.95	.94	.94	.93	.95	.95	.96	.98	.98	.99	.98	.99	.99	.99	.99	.98	.99	1.00
12	.85	.86	.94	.92	.97	.94	.93	.95	.96	.96	.97	.94	.93	.95	.96	.96	.95	.95	.94	.96	.96	.97	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
13	.85	.87	.93	.95	.94	.96	.96	.97	.94	.96	.96	.96	.94	.97	.96	.97	.96	.96	.95	.97	.96	.97	.98	.99	.99	.98	.99	.99	.99	.99	.99	.99	1.00
14	.87	.88	.92	.96	.94	.95	.95	.96	.94	.96	.96	.96	.95	.97	.97	.96	.97	.97	.96	.98	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
15	.91	.87	.92	.94	.94	.94	.95	.95	.95	.95	.96	.96	.94	.97	.97	.97	.96	.97	.96	.97	.96	.98	.97	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
16	.90	.89	.95	.93	.97	.94	.94	.96	.95	.96	.96	.96	.95	.97	.97	.97	.97	.97	.96	.97	.96	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
17	.92	.87	.95	.93	.97	.95	.95	.97	.95	.96	.96	.96	.95	.97	.97	.97	.97	.97	.96	.97	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
18	.91	.88	.95	.94	.97	.95	.95	.96	.94	.95	.96	.97	.96	.97	.97	.97	.98	.98	.97	.97	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
19	.91	.88	.93	.94	.97	.94	.97	.96	.97	.97	.96	.96	.98	.98	.97	.96	.96	.96	.96	.96	.96	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00
20	.91	.90	.94	.94	.97	.93	.94	.97	.97	.97	.98	.96	.96	.97	.98	.97	.96	.96	.96	.96	.97	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	1.00

*Underlined values indicate agreement level of .85 or greater.

criterion data, then it could be concluded that twenty days was an adequate sampling of activities in the classroom.

Table 21 presents the coefficients obtained by comparing Method B observations collected every thirty seconds and the daily cumulative criterion for every thirty seconds, as shown in Table 8. Each cell in each row of the matrix contains the coefficients computed between a specified number of students for a specified number of days and the daily cumulative criterion for the same number of days. For example, row one compares the observations for one through thirty-three students and the cumulative recordings for thirty-three students for one day. Similarly, row two compares observational data for one through thirty-three students and the cumulative recordings for thirty-three students for two days, and so on. Each cell of the last row of Table 21 is the same as the last row of Table 12.

It was noted in comparing Table 21 with Table 12 that the corresponding indices of each cell for days one through seven showed marked differences. During the first eight days, the indices differed as much as .31 on the first day for two of the cells to .08 for several of the cells on the seventh day. For days eight through twelve the coefficients did not differ more than .06. After thirteen days the differences between coefficients for corresponding cells were .03 or less. Therefore, it was concluded that twenty days was an adequate sampling period for this study.

Variations of the Daily Observation Period Over a Period of of Twenty Days

To examine the effect of shortening the daily thirty-minute observation period on the levels of agreement computed for one through thirty-three pupils, an investigation was carried out which utilized a

5, 10, 15, and 20 minute observation period over a twenty-day period. The recording interval was every thirty seconds. These conditions were previously listed in Table 3. With this investigation, it was possible to test hypothesis IV: The acceptable level of agreement is attained between the cumulative measurement obtained by Method B at thirty-second time intervals for each given observation period (5, 10, 15, and 20 minutes) for a sampling of pupils (one through thirty-three pupils) for one through twenty days and Criterion I. In order to examine the given observation periods, the data collected for the every thirty-second criterion were sampled.

The five-minute observation period was the shortest period studied. For five minutes each day for twenty days, activity frequencies were cumulated for one through thirty-three pupils. These frequencies were then compared to the twenty-day cumulative criterion to obtain the resulting coefficients shown in Table 22. The number of students whose activities were cumulated are shown at the top of each column and the number of days which were cumulated are shown at the beginning of each row. For example, when five students were observed for seven days and their activities cumulated, the resulting coefficient of agreement with the criterion was .93. Tables 22 through 26 are read in the same manner.

Upon examination of Table 22, it was noted that although many high levels of agreement were reached at various points for the five-minute observation period, they were not consistently followed by other high indices. However, when twenty-one pupils were observed on the first day, an acceptable level was reached and it was maintained throughout the twenty-day period, except for a few decreases which were never lower than .82. Also, when three pupils were observed

TABLE 22

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY THIRTY SECONDS FOR FIVE MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.40	-.25	-.20	-.04	-.08	-.19	-.19	.10	.12	.44	.33	.65	.76	.77	.76	.89	.86	.79	.74	.78	.89	.83	.86	.90	.89	.91	.89	.90	.88	.93	.85	.87	.90
2	.23	.21	.22	.40	.76	.78	.71	.69	.62	.69	.58	.72	.89	.86	.87	.86	.87	.83	.78	.81	.90	.84	.90	.94	.94	.91	.87	.86	.89	.85	.90	.87	.85
3	.55	.70	.74	.71	.85	.93	.81	.90	.87	.86	.79	.84	.90	.89	.87	.87	.87	.84	.80	.82	.87	.82	.84	.87	.84	.87	.82	.82	.86	.82	.86	.85	.83
4	.68	.79	.72	.86	.91	.90	.82	.88	.84	.88	.83	.85	.89	.87	.85	.93	.95	.91	.90	.90	.92	.87	.85	.87	.84	.87	.83	.82	.85	.84	.87	.86	.86
5	.71	.66	.75	.83	.92	.88	.92	.86	.87	.84	.87	.86	.90	.88	.87	.94	.95	.94	.92	.93	.93	.89	.87	.88	.84	.87	.84	.84	.87	.87	.90	.89	.91
6	.76	.73	.73	.75	.88	.89	.90	.89	.88	.88	.86	.85	.87	.85	.85	.89	.92	.92	.93	.92	.93	.89	.87	.88	.85	.88	.85	.84	.86	.87	.90	.89	.90
7	.74	.84	.78	.86	.93	.88	.89	.87	.87	.87	.86	.84	.89	.87	.87	.92	.94	.93	.93	.92	.94	.95	.95	.93	.91	.93	.90	.89	.91	.90	.94	.92	.93
8	.72	.87	.83	.86	.86	.88	.84	.87	.83	.89	.85	.86	.82	.85	.89	.88	.92	.92	.91	.92	.92	.95	.96	.94	.94	.96	.96	.94	.95	.94	.96	.95	.95
9	.63	.72	.82	.81	.83	.79	.83	.79	.83	.80	.80	.77	.75	.81	.79	.81	.80	.81	.81	.83	.83	.86	.88	.87	.91	.89	.92	.94	.93	.93	.91	.93	.92
10	.62	.74	.85	.79	.84	.75	.79	.76	.80	.76	.75	.72	.70	.77	.77	.78	.78	.80	.80	.83	.82	.85	.88	.87	.90	.89	.92	.94	.94	.93	.92	.93	.92
11	.74	.82	.89	.85	.92	.85	.87	.84	.89	.84	.84	.79	.77	.82	.82	.85	.82	.84	.84	.86	.87	.89	.92	.92	.95	.94	.96	.96	.96	.95	.96	.96	.95
12	.85	.82	.86	.86	.90	.84	.87	.84	.88	.86	.86	.82	.81	.86	.86	.86	.86	.88	.88	.90	.90	.93	.96	.94	.98	.96	.97	.96	.96	.95	.97	.97	.96
13	.77	.79	.88	.89	.93	.88	.91	.88	.90	.88	.88	.85	.84	.90	.89	.89	.89	.90	.90	.92	.92	.95	.97	.97	.96	.97	.95	.95	.94	.93	.95	.95	.94
14	.79	.78	.88	.89	.94	.90	.92	.89	.91	.87	.87	.84	.84	.88	.88	.88	.88	.89	.90	.91	.92	.95	.97	.97	.96	.98	.96	.95	.95	.94	.95	.95	.95
15	.87	.82	.93	.89	.89	.87	.89	.88	.91	.85	.87	.84	.84	.89	.87	.87	.87	.89	.88	.90	.91	.94	.95	.95	.96	.96	.96	.95	.95	.94	.96	.96	.95
16	.92	.91	.92	.91	.89	.84	.87	.86	.89	.85	.87	.84	.84	.89	.86	.87	.86	.87	.86	.88	.89	.91	.93	.94	.95	.95	.95	.96	.95	.95	.95	.96	.95
17	.81	.87	.92	.92	.90	.86	.89	.89	.92	.87	.89	.86	.85	.90	.88	.88	.88	.89	.88	.89	.90	.92	.93	.94	.96	.95	.96	.97	.97	.96	.96	.97	.96
18	.82	.85	.91	.90	.89	.86	.90	.89	.91	.87	.89	.86	.86	.91	.88	.89	.89	.89	.88	.89	.90	.92	.93	.94	.96	.95	.97	.98	.98	.97	.97	.98	.98
19	.88	.82	.88	.87	.87	.83	.86	.85	.86	.83	.77	.83	.83	.87	.85	.86	.85	.86	.85	.86	.88	.90	.91	.92	.94	.93	.95	.96	.97	.97	.95	.96	.97
20	.87	.85	.88	.88	.88	.84	.86	.85	.87	.85	.87	.84	.85	.89	.87	.88	.87	.87	.87	.87	.89	.91	.92	.93	.96	.95	.97	.98	.98	.98	.97	.98	.98

*Underlined values indicate agreement level of .85 or greater.

for twelve days an acceptance level of .86 was attained with no coefficients after this point for successive days or students falling below .81.

Nevertheless, there was doubt concerning the acceptance of the five-minute observation period when too few pupils or days were utilized. This was substantiated when the ten-minute observation period was explored. The interval time was the same, every thirty seconds. Examination revealed that in many cases the corresponding coefficients for the same number of days and students were lower for the ten-minute observation period than they were for the five-minute observation period. Table 23 presents the coefficients for the ten-minute observation period. Inspection of Table 23 showed that for the ten-minute observation period, it was necessary to observe nineteen students for two days to produce an acceptable level of agreement after which no decreases occurred lower than .81. Also, the observations of five students were required before a consistent level of agreement of .85 or higher was maintained for the twentieth day. It can be concluded that these results show only weak support for hypothesis IV with respect to the ten-minute observation period.

The next observation period that was investigated over a period of twenty days was the fifteen-minute observation period. The interval time was thirty seconds. The resulting coefficients from comparing these observations with the twenty-day cumulative criterion are shown in Table 24. Investigation revealed that the general level of corresponding coefficients increased over those computed for the ten-minute period. With this observation period seventeen days were needed to bring the level of agreement for one student to a consistent .85 or above although high coefficients were evidenced much earlier. Approximately fifteen pupils were required to be observed for a period of five

TABLE 23

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY THIRTY SECONDS FOR TEN MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.18	.35	.13	.34	.49	.79	.75	.81	.79	.80	.69	.69	.53	.61	.65	.65	.73	.66	.63	.61	.66	.69	.72	.64	.66	.64	.59	.54	.48	.53	.48	.49	.51
2	-.06	.62	.34	.49	.65	.76	.78	.69	.66	.66	.73	.85	.84	.86	.84	.94	.94	.93	.93	.91	.93	.93	.92	.91	.91	.91	.91	.92	.89	.90	.87	.87	.86
3	.48	.52	.70	.70	.74	.85	.81	.83	.79	.75	.79	.87	.87	.86	.84	.91	.87	.88	.89	.90	.88	.84	.85	.86	.84	.86	.87	.89	.92	.90	.91	.90	.90
4	.39	.43	.81	.80	.84	.84	.86	.86	.84	.85	.86	.86	.85	.84	.83	.90	.89	.88	.88	.88	.87	.87	.87	.86	.85	.86	.87	.89	.90	.89	.89	.89	.89
5	.66	.71	.7[illegible]	.84	.89	.89	.90	.89	.89	.88	.89	.88	.87	.87	.86	.92	.91	.90	.90	.90	.89	.88	.87	.87	.84	.86	.87	.88	.90	.90	.91	.90	.90
6	.69	.78	.84	.76	.84	.81	.85	.88	.89	.88	.89	.87	.86	.86	.86	.91	.91	.90	.90	.90	.89	.89	.87	.87	.86	.89	.89	.91	.91	.91	.90	.90	.90
7	.75	.75	.84	.72	.82	.83	.87	.90	.91	.91	.92	.91	.91	.91	.91	.95	.95	.93	.94	.93	.93	.94	.92	.92	.91	.94	.94	.95	.95	.95	.94	.94	.94
8	.70	.79	.77	.67	.78	.81	.83	.85	.92	.88	.91	.90	.88	.95	.95	.94	.92	.92	.93	.92	.94	.95	.96	.95	.95	.94	.95	.96	.94	.94	.92	.93	.92
9	.59	.66	.66	.60	.69	.67	.70	.72	.78	.77	.78	.78	.75	.82	.84	.81	.79	.79	.81	.82	.84	.84	.87	.86	.88	.85	.86	.87	.86	.85	.84	.86	.86
10	.65	.66	.68	.62	.70	.70	.71	.73	.79	.77	.79	.79	.77	.83	.84	.81	.79	.79	.81	.82	.84	.84	.86	.86	.87	.84	.85	.85	.85	.84	.84	.85	.85
11	.69	.66	.67	.66	.74	.74	.75	.78	.83	.80	.81	.80	.77	.83	.85	.82	.80	.80	.83	.82	.84	.85	.87	.87	.88	.85	.86	.86	.86	.85	.85	.86	.86
12	.68	.57	.62	.60	.71	.73	.72	.74	.81	.79	.81	.80	.78	.85	.86	.83	.81	.81	.83	.83	.85	.85	.88	.88	.89	.87	.87	.88	.87	.87	.87	.88	.88
13	.67	.58	.66	.66	.76	.79	.78	.80	.86	.83	.86	.84	.82	.87	.90	.88	.85	.85	.87	.87	.89	.88	.91	.91	.92	.90	.90	.90	.90	.90	.90	.91	.91
14	.68	.57	.66	.66	.76	.77	.77	.79	.84	.82	.84	.84	.82	.87	.89	.88	.85	.85	.88	.88	.89	.90	.92	.92	.93	.91	.91	.91	.91	.91	.91	.92	.92
15	.75	.59	.69	.69	.79	.80	.80	.82	.87	.85	.87	.85	.84	.89	.92	.90	.87	.87	.89	.88	.89	.90	.92	.92	.93	.91	.91	.91	.91	.92	.91	.92	.92
16	.82	.64	.69	.70	.80	.82	.82	.85	.90	.88	.89	.88	.87	.91	.94	.92	.89	.88	.90	.90	.91	.92	.94	.94	.94	.92	.92	.93	.93	.93	.93	.94	.93
17	.89	.68	.72	.74	.84	.86	.87	.89	.93	.92	.93	.92	.91	.95	.96	.95	.93	.92	.94	.93	.94	.96	.97	.97	.97	.95	.95	.96	.96	.97	.96	.97	.97
18	.86	.71	.73	.76	.84	.86	.86	.89	.94	.93	.94	.93	.91	.95	.96	.95	.93	.92	.94	.93	.94	.96	.97	.97	.97	.95	.95	.96	.96	.97	.96	.97	.97
19	.90	.70	.73	.75	.84	.84	.84	.87	.93	.91	.92	.91	.90	.94	.94	.93	.91	.91	.93	.92	.94	.95	.97	.96	.96	.95	.95	.96	.96	.97	.96	.97	.97
20	.90	.73	.73	.76	.85	.85	.85	.89	.93	.92	.93	.92	.92	.95	.96	.95	.93	.92	.94	.94	.95	.97	.98	.97	.97	.96	.97	.97	.97	.98	.98	.98	.98

*Underlined values indicate agreement level of .85 or greater.

TABLE 24

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY THIRTY SECONDS FOR FIFTEEN MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.20	.25	.08	.37	.41	.82	.83	.74	.71	.73	.88	.73	.55	.64	.67	.67	.76	.70	.65	.63	.66	.69	.71	.63	.65	.64	.60	.55	.49	.54	.48	.50	.52
2	.16	.56	.28	.57	.76	.64	.66	.79	.79	.78	.82	.81	.70	.77	.78	.83	.84	.78	.76	.77	.78	.80	.81	.77	.79	.79	.78	.79	.76	.78	.74	.76	.75
3	.48	.61	.40	.64	.80	.90	.89	.87	.83	.81	.84	.87	.84	.90	.87	.87	.91	.88	.85	.82	.81	.83	.84	.82	.85	.85	.86	.86	.84	.86	.84	.85	.86
4	.53	.73	.63	.80	.85	.84	.86	.85	.85	.86	.87	.87	.86	.89	.88	.90	.91	.89	.85	.84	.81	.83	.85	.84	.88	.88	.90	.89	.87	.89	.87	.90	.90
5	.61	.66	.62	.80	.80	.86	.85	.84	.79	.82	.83	.84	.87	.86	.86	.92	.92	.92	.91	.91	.89	.90	.90	.89	.89	.89	.89	.91	.91	.91	.91	.91	.92
6	.70	.71	.61	.72	.82	.86	.85	.82	.77	.81	.81	.84	.86	.83	.85	.90	.91	.91	.91	.90	.90	.90	.89	.89	.88	.88	.89	.90	.90	.91	.90	.90	.91
7	.77	.78	.67	.81	.87	.88	.89	.85	.79	.84	.85	.87	.91	.88	.89	.94	.94	.93	.90	.91	.90	.91	.93	.91	.92	.92	.92	.94	.92	.93	.91	.93	.94
8	.79	.85	.81	.91	.90	.91	.94	.92	.87	.90	.92	.94	.94	.94	.95	.98	.98	.97	.92	.92	.91	.92	.94	.91	.93	.93	.95	.94	.93	.94	.93	.94	.94
9	.62	.84	.86	.82	.85	.81	.84	.88	.93	.91	.88	.85	.83	.87	.88	.85	.84	.83	.80	.81	.81	.82	.85	.84	.86	.85	.87	.86	.85	.85	.84	.86	.86
10	.69	.81	.84	.82	.82	.80	.83	.86	.92	.90	.88	.86	.83	.87	.88	.85	.84	.83	.80	.82	.82	.83	.86	.85	.86	.86	.87	.86	.86	.85	.86	.87	.87
11	.84	.84	.88	.88	.91	.87	.89	.94	.96	.94	.93	.91	.87	.92	.93	.90	.88	.87	.84	.85	.85	.87	.90	.88	.90	.89	.90	.90	.89	.89	.89	.90	.90
12	.83	.86	.91	.87	.88	.85	.87	.92	.98	.95	.95	.92	.90	.93	.93	.91	.89	.88	.86	.87	.87	.88	.91	.90	.92	.90	.92	.91	.91	.91	.91	.92	.92
13	.85	.87	.91	.92	.94	.91	.93	.96	.95	.96	.97	.95	.93	.96	.96	.94	.92	.91	.88	.90	.89	.90	.93	.92	.93	.92	.93	.93	.93	.92	.93	.94	.93
14	.91	.87	.91	.93	.94	.91	.93	.97	.96	.96	.96	.97	.94	.97	.98	.96	.94	.91	.91	.92	.91	.93	.95	.94	.95	.94	.95	.94	.94	.94	.94	.95	.94
15	.84	.82	.88	.86	.88	.88	.91	.95	.95	.94	.93	.93	.93	.94	.95	.94	.92	.92	.90	.91	.90	.92	.93	.93	.94	.93	.94	.93	.93	.93	.93	.93	.93
16	.78	.85	.90	.87	.88	.89	.91	.95	.94	.94	.94	.94	.93	.95	.96	.94	.93	.92	.90	.91	.90	.92	.93	.93	.94	.93	.94	.93	.94	.93	.92	.93	.93
17	.89	.87	.91	.88	.90	.90	.93	.96	.95	.95	.94	.95	.94	.95	.96	.95	.93	.93	.91	.91	.90	.92	.93	.94	.94	.94	.94	.94	.94	.94	.93	.93	.94	.94
18	.90	.91	.92	.90	.90	.91	.93	.96	.93	.93	.94	.96	.94	.96	.96	.95	.94	.94	.92	.92	.91	.93	.94	.94	.94	.94	.94	.94	.94	.94	.93	.94	.94
19	.86	.88	.91	.89	.90	.92	.92	.96	.94	.94	.95	.96	.91	.96	.96	.95	.93	.93	.91	.91	.91	.93	.94	.94	.95	.94	.95	.95	.95	.94	.94	.95	.95
20	.84	.89	.91	.90	.92	.93	.92	.96	.94	.94	.95	.97	.96	.97	.96	.96	.95	.94	.92	.92	.91	.93	.94	.95	.95	.95	.96	.95	.96	.92	.95	.95	.96

*Underlined values indicate agreement level of .85 or greater.

days before a fairly consistent acceptable level of agreement was attained. However, if the .80 level had been acceptable, approximately five students observed for three days would have been sufficient. Moreover, by the thirteenth day nearly all the coefficients of the matrix had reached a .90 level of agreement for three through thirty-three pupils. Therefore, from these results it can be concluded that the fifteen-minute observation period moderately supports hypothesis IV.

The fourth shortened observation period to be investigated over a period of twenty days was the twenty-minute observation period. The resulting coefficients computed from comparing these observations with the twenty-day criterion are presented in Table 25. Nineteen days of observing one randomly selected pupil each day were required to produce a consistent acceptable level of .85 or above. However, with the exception of a few days, the observing of fourteen pupils for two days produced very consistently high coefficients. Comparing these coefficients with those obtained when a thirty-minute observation period was utilized, shown in Table 12, revealed that except for a few more indices falling slightly below the acceptance level of .85, the twenty-minute observation period was as acceptable as the thirty-minute observation period. Also, approximately two-thirds of the coefficients for the twenty-minute observation period were .90 or above. The column for thirty-three students of Table 25 indicates slightly lower but acceptable levels of agreement as the days were cumulated than those found in Table 12 as the days were cumulated for thirty-minute observation periods. Both tables show consistent levels were maintained for thirty-three students after the second day's observations were added. Because of the foregoing evidence, it was concluded that there is strong support for hypothesis IV when the twenty-minute observation period is employed.

TABLE 25

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY METHOD B EVERY THIRTY SECONDS FOR TWENTY MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Students

Cumulative Number of Days	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
1	-.27	.16	.06	.24	.31	.78	.81	.75	.72	.76	.86	.70	.54	.62	.65	.71	.80	.77	.69	.67	.72	.73	.76	.67	.68	.67	.65	.66	.59	.64	.58	.60	.62
2	.07	.54	.30	.57	.78	.81	.84	.86	.81	.78	.80	.85	.79	.86	.87	.86	.88	.87	.85	.85	.87	.90	.90	.86	.88	.88	.88	.89	.86	.87	.85	.84	.85
3	.44	.73	.56	.68	.79	.88	.88	.87	.83	.80	.81	.86	.85	.88	.88	.92	.94	.91	.89	.88	.88	.91	.91	.89	.90	.89	.90	.92	.92	.92	.92	.92	.92
4	.35	.68	.71	.85	.86	.85	.86	.85	.84	.85	.85	.85	.85	.87	.87	.91	.91	.89	.88	.87	.85	.89	.89	.88	.88	.88	.88	.90	.90	.91	.90	.90	.91
5	.60	.77	.62	.76	.86	.89	.89	.87	.87	.87	.87	.86	.88	.87	.88	.92	.91	.91	.91	.90	.90	.90	.89	.90	.87	.88	.87	.88	.90	.90	.90	.90	.91
6	.54	.80	.71	.86	.89	.86	.88	.86	.86	.86	.85	.85	.87	.86	.87	.90	.90	.90	.90	.89	.89	.90	.88	.89	.87	.89	.88	.89	.90	.90	.90	.89	.90
7	.60	.84	.75	.87	.89	.89	.92	.91	.87	.90	.87	.89	.92	.91	.91	.93	.93	.93	.92	.93	.92	.93	.93	.92	.92	.92	.92	.93	.93	.93	.93	.92	.93
8	.68	.87	.87	.86	.88	.90	.94	.95	.94	.95	.94	.95	.96	.97	.96	.97	.97	.97	.94	.93	.93	.94	.95	.94	.95	.95	.96	.96	.95	.96	.95	.95	.94
9	.60	.72	.83	.79	.82	.78	.80	.82	.86	.85	.86	.85	.81	.86	.88	.87	.84	.83	.82	.83	.83	.85	.87	.86	.88	.88	.89	.89	.88	.88	.87	.88	.88
10	.66	.74	.85	.80	.83	.79	.80	.81	.85	.83	.85	.84	.81	.86	.88	.86	.84	.83	.82	.83	.83	.85	.87	.87	.88	.88	.89	.89	.88	.88	.87	.89	.88
11	.63	.73	.85	.83	.87	.84	.83	.85	.89	.86	.88	.86	.83	.87	.89	.88	.86	.85	.85	.86	.85	.86	.89	.88	.89	.88	.90	.90	.89	.89	.89	.89	.89
12	.68	.74	.85	.80	.86	.85	.83	.84	.90	.87	.90	.87	.85	.88	.90	.89	.87	.87	.87	.88	.87	.88	.91	.90	.91	.90	.91	.92	.91	.91	.90	.90	.90
13	.71	.76	.89	.86	.92	.90	.88	.90	.95	.92	.94	.91	.88	.91	.93	.92	.91	.90	.90	.91	.90	.91	.93	.92	.93	.92	.93	.93	.93	.92	.92	.92	.92
14	.72	.77	.91	.87	.93	.91	.89	.91	.94	.91	.94	.91	.89	.91	.93	.92	.91	.91	.90	.92	.91	.92	.94	.93	.94	.93	.94	.94	.94	.94	.93	.93	.93
15	.79	.77	.90	.87	.93	.91	.90	.91	.95	.92	.94	.91	.89	.92	.94	.93	.91	.91	.91	.91	.91	.92	.94	.93	.94	.93	.94	.94	.94	.94	.93	.94	.93
16	.87	.83	.91	.89	.93	.91	.90	.92	.96	.93	.95	.92	.90	.93	.95	.94	.92	.91	.91	.92	.91	.93	.94	.94	.94	.93	.94	.94	.94	.94	.94	.94	.93
17	.83	.83	.89	.89	.95	.94	.93	.95	.97	.96	.97	.94	.92	.95	.97	.96	.94	.93	.93	.94	.93	.94	.95	.95	.96	.95	.96	.96	.96	.96	.95	.96	.95
18	.83	.86	.91	.92	.96	.96	.95	.97	.95	.97	.98	.96	.95	.97	.98	.97	.95	.95	.95	.95	.94	.95	.97	.97	.97	.96	.97	.97	.97	.97	.96	.97	.96
19	.85	.84	.89	.90	.94	.92	.92	.95	.98	.95	.96	.94	.93	.95	.95	.94	.92	.92	.93	.93	.93	.94	.95	.95	.96	.95	.96	.96	.96	.96	.95	.96	.95
20	.87	.86	.90	.91	.95	.93	.94	.95	.98	.96	.97	.95	.94	.97	.97	.96	.94	.94	.94	.94	.94	.95	.96	.97	.97	.96	.97	.98	.98	.98	.97	.97	.97

*Underlined values indicate agreement level of .85 or greater.

Therefore, the statement of hypothesis IV ~~that the~~ acceptable level of agreement is attained between the cumulative measurement obtained by Method B at thirty-second time intervals for each given observation period for a sampling of pupils for one through twenty days and Criterion I shows weak support when the five- and ten-minute observation periods are utilized, moderate support with the fifteen-minute observation period, and strong support when the twenty-minute observation period is employed.

Sub-Cycle Observational Techniques

All previous discussion of Method B has been based on observational data which were collected for an entire observation period on each pupil in a given sampling of pupils. It had been recognized that to acquire these observations in actual practice would require one or more observers depending upon the number of pupils being observed in one classroom. Therefore, in order to gain additional information to answer the question, "How could one observer best be utilized in the classroom?", another procedure was followed. This was to divide each observational period into small sub-cycles. For example, a thirty-minute observation period could be divided into six sub-cycles of five minutes each. This would then allow the observer to observe the same or different pupils in each sub-cycle. All observations examined for the sub-cycle technique were obtained by sampling the data collected for the every thirty-second criterion.

(1) Continuous Observations Within a Sub-Cycle

Previously discussed data related to Method B has been the result of utilizing a technique which produced a record of almost continuous observations on each pupil observed. This same technique of continuous observation was also followed within sub-cycles. These investigations were carried out to test hypothesis V: The acceptable

level of agreement is attained between cumulative continuous measurement obtained by Method B on a sampling of pupils (2, 3, 6, and 15 pupils) at each given time interval (30 seconds, 1, 2, 5, 10, and 15 minutes) during each given observation period (2, 5, 10, and 15 minutes) within a thirty-minute observation period for one through twenty days and Criterion I, the twenty-day cumulative criterion. Table 4 lists the variations of the continuous observation technique within a sub-cycle examined in this study.

The first investigation divided the thirty-minute observation period into fifteen sub-cycles of two minutes each. Each day fifteen pupils were randomly selected and one pupil was assigned to one of the fifteen sub-cycles. This allowed a two-minute observation period for each pupil. A recording interval of thirty seconds was utilized. Therefore, four continuous daily recordings were made on each of fifteen pupils. Each day the recordings of the fifteen pupils were cumulated and compared to the twenty-day criterion. The first column of Table 26 shows the resulting coefficients of these comparisons. For example, the cumulative observations of fifteen pupils who were observed in one of the two-minute cycles and compared to the criterion yielded a .10 coefficient while the cumulative observations of two days produced a .56 level of agreement. Ten days of cumulated observations were necessary to obtain a consistently acceptable level of indices. It was concluded that under these conditions the results show moderately strong support for hypothesis V.

The next sub-cylce to be investigated was the five-minute. Each thirty-minute observation was sub-divided into six sub-cycles of five minutes each. This enabled six pupils to be observed for five minutes each. The recording interval was thirty seconds. Therefore, ten continuous observations were recorded on each pupil. The resulting

TABLE 26

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH ONE STUDENT OBSERVED IN EACH SUB-CYCLE EVERY THIRTY SECONDS AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number of Sub-cycles and Students with Sub-cycle Time Lengths			
	15 (2 min)	6 (5 min)	3 (10 min)	2 (15 min)
1	.10	.37	.21	-.43
2	.56	.76	.71	.25
3	.78	.86	.52	.67
4	.85	.76	.77	.76
5	.83	.78	.92	.85
6	.81	.73	.86	.84
7	.87	.77	.90	.74
8	.83	.87	.91	.60
9	.80	.87	.88	.72
10	.85	.87	.81	.67
11	.86	.88	.82	.69
12	.86	.90	.85	.77
13	.90	.92	.87	.83
14	.93	.89	.88	.82
15	.95	.87	.83	.91
16	.93	.91	.83	.77
17	.95	.87	.83	.78
18	.94	.86	.85	.76
19	.94	.86	.84	.78
20	.94	.86	.87	.80

*Underlined values indicate agreement level of .85 or greater.

coefficients for the daily cumulative recordings of six sub-cycles are shown in column two of Table 26. Since a consistent level of agreement was attained after the eighth day's observations were added, it can be concluded that the five-minute sub-cycle with a thirty-second recording interval shows moderately strong support for hypothesis V, as does the two-minute sub-cycle.

When only three students were observed within one of three ten-minute sub-cycles, the indices showed a high acceptable level of agreement as early as the fifth day. However, an acceptable level was never consistently maintained at any point for fluctuation was always evidenced. These coefficients are shown in the third column of Table 26. Also, when only two students were observed every thirty seconds within one of two fifteen-minute sub-cycles, no consistent level of acceptance was attained after twenty days, as shown in the last column of Table 26, although a .85 was recorded as early as the fifth day and a .95 on the fifteenth day. It was concluded that neither the ten-minute nor the fifteen-minute sub-cycle with observations recorded every thirty seconds shows support for hypothesis V.

The investigation of hypothesis V was continued by exploring the one-minute time interval and varying the number of pupils being continuously observed within sub-cycle observation periods. Table 27 shows the resulting coefficients when the observations were compared to the twenty-day cumulative criterion. With fifteen students each observed for two minutes, an acceptable level was reached on the fifth day and maintained with successive additions through eight days but then it decreased and did not reach and maintain the acceptance level again until the thirteenth day. When six students were observed for five minutes every one minute, a .85 level of agreement was reached on the eleventh day and remained at an acceptable level for all other additions. The data for three students each observed for ten minutes

TABLE 27

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH ONE STUDENT OBSERVED IN EACH SUB-CYCLE EVERY ONE MINUTE AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number of Sub-cycles and Students with Sub-cycle Time Lengths			
	15 (2 min)	6 (5 min)	3 (10 min)	2 (15 min)
1	.21	-.46	-.02	.40
2	.75	.40	.77	.61
3	.86	.59	.45	.62
4	.76	.59	.57	.45
5	.88	.77	.63	.65
6	.92	.74	.76	.69
7	.90	.81	.68	.74
8	.85	.86	.78	.71
9	.77	.78	.73	.68
10	.80	.81	.74	.68
11	.82	.85	.77	.64
12	.84	.90	.80	.60
13	.89	.86	.81	.66
14	.90	.90	.83	.64
15	.91	.88	.85	.68
16	.93	.90	.84	.66
17	.95	.88	.86	.71
18	.94	.86	.82	.74
19	.92	.85	.83	.76
20	.95	.89	.85	.76

*Underlined values indicate agreement level of .85 or greater.

every one minute showed that although a .85 was attained on the fifteenth day, it was not consistent. At no time did the observational activities of two students observed for fifteen minutes each and compared to the criterion reach even a .80 agreement. Therefore, it was concluded that the two- and five-minute sub-cycles show moderate support for hypothesis V since consistent acceptable levels of agreement were reached with the twenty-day cumulative criterion, but this was not true with the ten- and fifteen-minute sub-cycle data. Therefore, when the ten- and fifteen-minute sub-cycle are employed with the one-minute time interval, hypothesis V is not supported.

Continuing the examination of holding the time interval constant to investigate hypothesis V, while varying the number of students and the observation period per student, led to looking at the every two-minute time interval. The coefficients resulting from comparison with the twenty-day cumulative criterion are displayed in Table 28. With the two-minute interval and a sub-cycle of two minutes, the coefficients did not maintain a steady acceptance level until the sixteenth day's recordings were added. This was three days later than the every one-minute interval for the same sub-cycle length (cf., Table 27) and six days later than the every thirty-second interval (cf., Table 26). Also, the acceptance level of the coefficients for the five-minute sub-cycle were reached much later than when every thirty-second interval was used and one day later than with every one minute, although the coefficients for the ten-minute sub-cycle appeared to be more representative of the criterion than those found for the every thirty-second and every one-minute time interval. As previously discovered, there was no consistency with the fifteen-minute sub-cycle utilizing the observations of two students in the thirty-minute observation period. It was concluded that the data do

TABLE 28

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH ONE STUDENT OBSERVED IN EACH SUB-CYCLE EVERY TWO MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number of Sub-cycles and Students with Sub-cycle Time Lengths			
	15 (2 min)	6 (5 min)	3 (10 min)	2 (15 min)
1	.45	-.20	.46	.05
2	.78	.57	.91	.58
3	.83	.51	.89	.90
4	.64	.39	.70	.70
5	.70	.56	.60	.73
6	.80	.56	.70	.69
7	.76	.61	.76	.72
8	.84	.68	.68	.70
9	.85	.80	.83	.75
10	.82	.79	.86	.76
11	.80	.76	.88	.82
12	.85	.86	.79	.85
13	.79	.88	.82	.84
14	.84	.85	.90	.86
15	.84	.89	.86	.85
16	.91	.92	.88	.80
17	.86	.94	.88	.82
18	.86	.90	.90	.80
19	.85	.91	.84	.79
20	.84	.91	.86	.84

*Underlined values indicate agreement level of .85 or greater.

not support a two-minute recording time interval with respect to hypothesis V for obtaining acceptable levels of agreement when comparisons are made to the twenty-day cumulative criterion.

The next time interval to be utilized in continuous sub-cycle observations to investigate hypothesis V, was the five-minute time interval. The coefficients for the various sub-cycles when they were compared to the twenty-day criterion are presented in Table 29. In the first column are the coefficients resulting from the data collected on six students for five minutes each. A satisfactory index of .87 was yielded after the fifteenth day of recording and continued for three more additions but it decreased to .84 when the fifteenth day's frequencies were added. The second column shows the coefficients for the observations on three students each observed within one ten-minute sub-cycle. An acceptable level was reached and maintained on the fifteenth day of cumulating observations. Once again as with the other recording intervals, the coefficients of two students observed within one of the two fifteen-minute sub-cycles showed no consistency. From the data it was concluded that the five-minute recording interval does not show support for hypothesis V for a five- and fifteen-minute sub-cycle because consistent acceptable levels of agreement were not attained when the observations were compared to the twenty-day cumulative criterion. However, the ten-minute sub-cycle does show moderate support since there was consistently acceptable agreement from the fifteenth day through the twentieth.

Another sub-cycle and interval variation that was investigated to test hypothesis V was the ten-minute sub-cycle with a ten-minute time interval. The activities of three students were included with one student recorded in each sub-cycle. When the recordings were compared to the twenty-day cumulative criterion, there were no coefficients computed above

TABLE 29

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH ONE STUDENT OBSERVED IN EACH SUB-CYCLE EVERY FIVE MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number of Sub-cycles and Students with Sub-cycle Time Lengths		
	6 (5 min)	3 (10 min)	2 (15 min)
1	-1.33	-.14	-.21
2	.01	.64	.17
3	.53	.42	.55
4	.25	.64	.73
5	.20	.75	.84
6	.47	.55	.78
7	.52	.64	.74
8	.53	.61	.57
9	.65	.60	.74
10	.64	.51	.61
11	.68	.63	.65
12	.77	.67	.69
13	.79	.70	.76
14	.81	.82	.81
15	.87	.90	.80
16	.88	.89	.85
17	.90	.87	.89
18	.87	.88	.84
19	.84	.88	.82
20	.82	.85	.82

*Underlined values indicate agreement level of .85 or greater.

.84 at the eighteenth day. These coefficients are shown in Table 30. Also shown in Table 30 are the coefficients which resulted from comparing the agreement of the twenty-day cumulative criterion and two students' activities in one of the two fifteen-minute cycles with observations recorded every fifteen minutes. There were no coefficients produced above .76 which was yielded for the nineteenth day. Therefore, these data do not show support for hypothesis V.

From the foregoing analyses, it was concluded that one observer could be advantageously utilized to record continuous observations on one pupil within a sub-cycle. The thirty-second time interval yields the most consistent coefficients at a .85 or higher level of agreement. Also, the two-minute and five-minute sub-cycles produce the most consistent and acceptable indices in support of hypothesis V when the data from these sub-cycles are compared to the twenty-day cumulative criterion.

(2) Intermittent Observations Within a Sub-Cycle With the Same Students in Each Cycle

Another technique which can be utilized by one observer to obtain observations by Method B is the intermittent observation technique. First, the thirty-minute observation period is divided into a designated number of sub-cycles. Next, a designated number of pupils are assigned to each sub-cycle. Only one pupil is observed at a time. For example, if five pupils are assigned to a five-minute sub-cycle and the time interval is every one minute, then at the beginning of the first one-minute interval, the first student is observed and at the beginning of the second-minute interval the second pupil is observed. This procedure is repeated until all five pupils are observed. Then at the beginning of the next five-minute sub-cycle the procedure is repeated. Within a thirty-minute observation period each pupil would be observed at six intermittent times. All of the variations of intermittent observational techniques within a sub-cycle with the same students in each cycle examined in this study were previously listed in Table 5.

TABLE 30

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH ONE STUDENT OBSERVED IN EACH SUB-CYCLE EVERY TEN MINUTES AND EVERY FIFTEEN MINUTES AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION

Cumulative Number of Days	Number of Sub-cycles and Students with Sub-cycle Time Lengths	
	Every 10 minutes 3 (10 min)	Every 15 minutes 2 (15 min)
1	.55	-1.33
2	.01	-1.33
3	.32	-1.33
4	.55	-.56
5	.63	-.62
6	.67	-.10
7	.70	-.19
8	.72	.11
9	.70	.59
10	.75	.70
11	.68	.58
12	.81	.47
13	.82	.37
14	.83	.47
15	.83	.55
16	.74	.61
17	.82	.67
18	.84	.72
19	.79	.76
20	.73	.70

Intermittent recordings within sub-cycles into which the thirty-minute observation period was divided were investigated to test hypothesis VI: The acceptable level of agreement is attained between the cumulative intermittent measurement obtained by Method B on a sampling of pupils (5, 10, and 15 pupils) at each given time interval (30 seconds, 1, and 2 minutes) in sub-cycles of each given length (2 1/2, 5, 7 1/2, 10, 15, 20, and 30 minutes) within a thirty-minute observation period with the same pupils in each cycle for one through twenty days and Criterion I. Observation Method B was utilized. Each day students were randomly selected and the same pupils were observed in each cycle. The cumulative observations of this technique and their agreement with the twenty-day cumulative criterion, Criterion I, were investigated.

The resulting coefficients obtained from observing five pupils intermittently are shown in Table 31. The first column represents the results of twelve sub-cycles each lasting 2 1/2 minutes with recordings on one student every thirty seconds. An acceptable level of agreement was achieved on the twelfth day at .86 with a high level maintained for the remainder of the observation period. When recordings were made every one minute within six daily sub-cycles of five minutes each, a .87 was attained on the nineteenth day and a .88 was yielded on the twentieth. In the last column of Table 31 are the results yielded when the observations of five students were recorded every two minutes within three sub-cycles of ten minutes each. These data yielded acceptable coefficients from the eleventh through the twentieth day. Therefore, it was concluded that when the same five students are observed intermittently every thirty seconds in twelve two and a half-minute cycles or every two minutes in three ten-minute cycles, there is moderate support shown for hypothesis VI but only weak support for observing the same five students every one minute in six five-minute cycles.

TABLE 31

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF INTERMITTENT SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH THE SAME FIVE STUDENTS IN EACH CYCLE AND THE TWENTY-DAY CUMULATIVE EVERY THIRTY-SECONDS CRITERION*

Cumulative Number of Days	Number and Length of Sub-cycles: Every 30 seconds 12 (2 1/2 min)	Every 1 minute 6 (5 min)	Every 2 minutes 3 (10 min)
1	.03	.14	-.07
2	.12	.42	.17
3	.33	.69	.36
4	.30	.80	.34
5	.43	.71	.58
6	.56	.70	.77
7	.69	.73	.73
8	.70	.75	.81
9	.84	.78	.81
10	.81	.75	.80
11	.80	.80	.85
12	.86	.83	.87
13	.86	.79	.88
14	.91	.78	.88
15	.92	.80	.89
16	.94	.80	.90
17	.93	.82	.93
18	.92	.84	.94
19	.93	.87	.95
20	.91	.88	.96

*Underlined values indicate agreement level of .85 or greater.

In Table 32 are the coefficients which were yielded as a result of comparing the twenty-day cumulative criterion and intermittent sub-cycles utilizing the thirty-second time interval for ten students. When six sub-cycles lasting five minutes were employed, a coefficient of .86 was obtained on the ninth day. The coefficients consistently increased to reach a .93 on the nineteenth and twentieth days. This same high level of acceptance was also noted for ten students who were observed every one minute in three sub-cycles of ten minutes. A .90 was computed for eight days of recording. It was, therefore, concluded that these high levels of agreement with the twenty-day cumulative criterion indicate strong support for hypothesis VI when the same ten students are observed every thirty seconds in six five-minute cycles or every one minute in three ten-minute cycles.

When the activities of fifteen pupils were recorded intermittently every thirty seconds in four sub-cycles of seven and one-half minutes and then compared to the twenty-day cumulative criterion, a consistent acceptance level was attained after nine days of recording. On the ninth day the index was .87 and it continued to remain at .85 or above until the twentieth day. A .94 was computed for the twentieth day. These coefficients are shown in Table 33. The second column of Table 33 gives the indices computed from comparing the observations recorded intermittently on fifteen pupils every one minute in two fifteen-minute sub-cycles. An acceptable level of .85 was computed on the seventh day but there were two decreases to .84 on the tenth and twelfth days. After the twelfth day, the indices remained consistently above .85. From this evidence, it was concluded that the high acceptable coefficients that result from observing the same fifteen pupils every thirty seconds in four seven and one-half-minute sub-cycles give strong support to hypothesis VI, while the slightly lower indices which result from

TABLE 32

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF INTERMITTENT SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH THE SAME TEN STUDENTS IN EACH CYCLE AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number and Length of Sub-cycles: Every 30 seconds 6 (5 min)	Every 1 minute 3 (10 min)
1	.65	.09
2	.80	.80
3	.61	.88
4	.51	.81
5	.50	.74
6	.56	.81
7	.71	.83
8	.78	.90
9	.86	.86
10	.85	.87
11	.90	.89
12	.90	.89
13	.90	.89
14	.90	.89
15	.91	.91
16	.93	.93
17	.92	.94
18	.92	.92
19	.93	.95
20	.93	.95

*Underlined values indicate agreement level of .85 or greater.

TABLE 33

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF INTERMITTENT SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH THE SAME FIFTEEN STUDENTS IN EACH CYCLE AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number and Length of Sub-cycles: Every 30 seconds 4 (7 1/2 min)	Every 1 minute 2 (15 min)
1	.88	.21
2	.75	.81
3	.74	.79
4	.80	.71
5	.79	.75
6	.79	.75
7	.80	.85
8	.82	.87
9	.87	.86
10	.87	.84
11	.87	.86
12	.87	.84
13	.85	.86
14	.88	.86
15	.88	.90
16	.89	.88
17	.91	.90
18	.92	.91
19	.93	.93
20	.94	.94

*Underlined values indicate agreement level of .85 or greater.

comparing the observations of the same fifteen pupils every one minute in two fifteen-minute sub-cycles and the twenty-day cumulative criterion show moderate support for hypothesis VI.

From the foregoing analyses of the data, it was concluded that the acceptance level of .85 could be attained in approximately nine days by one observer intermittently recording the activities of the same ten pupils every thirty seconds in six five-minute sub-cycles or by intermittently recording the activities of the same ten pupils every one minute in three ten-minute sub-cycles. Also, it could be attained by one observer intermittently recording the activities of the same fifteen pupils every thirty seconds in four seven and one-half-minute sub-cycles.

(3) Intermittent Observations Within a Sub-Cycle With Different Students in Each Cycle

This variation of the intermittent technique requires that different students be assigned to each sub-cycle. Each day a designated number of pupils are randomly selected. In this study five different students were selected for each sub-cycle so the number of students selected daily varied according to the number of sub-cycles utilized. The sub-cycle time lengths and the recording time intervals were shown in Table 6. It was possible that students were observed more than once during a sub-cycle for this was dependent upon the length of the sub-cycle and the time interval, although only one pupil was observed at the beginning of each time interval. For example, two observations were recorded for each pupil when five students were observed intermittently for five minutes with the thirty-second time interval being utilized. The first student would have been observed at the beginning of the first and sixth intervals while the second pupil would have been observed at the beginning of the second and seventh intervals in the first five-minute sub-cycle. The data produced from these observations were used to test hypothesis VII: The

acceptable level of agreement is attained between the cumulative intermittent measurement obtained by Method B on a sampling of pupils (10, 15, and 30 pupils) at each given time interval (30 seconds and one minute) in sub-cycles of each given length (5, 10, and 15 minutes) within a thirty-minute observation period with five different pupils in each cycle for one through twenty days and Criterion I.

The coefficients shown in Table 34 were the result of comparing the twenty-day cumulative criterion and the pupil activity observations recorded every thirty seconds in sub-cycles of varying lengths. Column one of Table 34 shows the coefficients computed when six sub-cycles of five minutes each were employed. This division of the thirty-minute observation period permitted a total of thirty pupils to be observed in one day. High coefficients were produced for days four through eight but it was noted that it was necessary to observe for eleven days before a consistently high level was attained. The second column of Table 34 indicated that it was necessary to observe five different pupils every thirty seconds in three ten-minute sub-cycles for nine days to attain a consistent acceptable level of agreement. A .90 or higher was maintained for days nine through twenty. Since the observation period was divided into three sub-cycles of ten minutes each, fifteen pupils were observed each day. The last column of Table 34 shows that when five different pupils were observed every thirty seconds in two fifteen-minute sub-cycles, a .89 was attained on the eighth day and continued at a high level through the remaining observation period. A total of ten students was observed each day. The results of utilizing the thirty-second time interval to record the observations of five different pupils in six sub-cycles of five minutes each show rather strong support for hypothesis VII when they are compared to the twenty-day cumulative criterion, and strong support for hypothesis VII is indicated when five

TABLE 34

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF INTERMITTENT SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH FIVE DIFFERENT STUDENTS OBSERVED EVERY THIRTY-SECONDS IN EACH SUB-CYCLE AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number and Length of Sub-cycles Total Number of Students: 6 (5 min) 30 Students	3 (10 min) 15 Students	2 (15 min) 10 Students
1	.48	.71	.80
2	.70	.65	.70
3	.76	.47	.73
4	.86	.63	.70
5	.93	.69	.66
6	.85	.69	.71
7	.85	.77	.83
8	.88	.81	.89
9	.80	.90	.92
10	.84	.91	.95
11	.89	.92	.93
12	.93	.90	.92
13	.94	.93	.92
14	.94	.93	.93
15	.92	.91	.92
16	.93	.91	.94
17	.95	.94	.92
18	.96	.96	.93
19	.96	.95	.94
20	.97	.94	.93

*Underlined values indicate agreement level of .85 or greater.

different pupils are observed in three sub-cycles of ten minutes each or in two sub-cycles of fifteen minutes each.

Table 35 presents the coefficients computed when the time interval was one minute for the same number of pupils and sub-cycles utilized to obtain the indices that were shown in Table 34. When five different pupils were observed in six cycles of five minutes each, eight days were required to attain an acceptable level. The second column of Table 35 shows that only on the third day was an acceptable level computed for five different pupils observed in three sub-cycles of ten minutes each. The highest coefficient computed after this point was .82. As shown in the last column of Table 35, when five different students were observed in two fifteen-minute sub-cycles, twelve days were required to produce a consistent level of agreement. However, the coefficients computed for days four through eight did range from .88 to .92. It was, therefore, concluded that when the activities of five different pupils are recorded every one minute in six cycles of five minutes each or in two cycles of fifteen minutes each and compared to the twenty-day criterion, there is evidence of strong support for hypothesis VII but when activities are recorded in three sub-cycles of ten minutes each, there is no support for hypothesis VII.

From the preceding data, it was concluded that hypothesis VII could be strongly supported when intermittent recordings are obtained every thirty seconds or every one minute on five different pupils in six five-minute sub-cycles or in two fifteen-minute sub-cycles. Also, strong support is indicated when five different pupils are observed every thirty seconds in three ten-minute sub-cycles. Utilization of one observer would have produced consistent levels of agreement of .85 or higher after approximately eight days of recording behaviors.

TABLE 35

SCOTT COEFFICIENTS OF AGREEMENT BETWEEN VARYING NUMBERS OF INTERMITTENT SUB-CYCLES WITHIN A THIRTY-MINUTE OBSERVATION PERIOD WITH FIVE DIFFERENT STUDENTS OBSERVED EVERY ONE MINUTE IN EACH SUB-CYCLE AND THE TWENTY-DAY EVERY THIRTY-SECONDS CUMULATIVE CRITERION*

Cumulative Number of Days	Number and Length of Sub-cycles Total Number of Students: 6 (5 min) 30 Students	3 (10 min) 15 Students	2 (15 min) 10 Students
1	.49	.37	.20
2	.63	.76	.64
3	.60	<u>.89</u>	.80
4	.69	.73	<u>.88</u>
5	.76	.76	<u>.91</u>
6	.75	.74	<u>.92</u>
7	.78	.74	<u>.95</u>
8	<u>.90</u>	.72	<u>.92</u>
9	<u>.95</u>	.67	.81
10	<u>.93</u>	.70	.81
11	<u>.91</u>	.71	.84
12	<u>.94</u>	.73	<u>.85</u>
13	<u>.95</u>	.74	<u>.88</u>
14	<u>.95</u>	.77	<u>.86</u>
15	<u>.96</u>	.81	<u>.87</u>
16	<u>.93</u>	.79	<u>.88</u>
17	<u>.94</u>	.82	<u>.89</u>
18	<u>.94</u>	.82	<u>.89</u>
19	<u>.94</u>	.82	<u>.90</u>
20	<u>.93</u>	.82	<u>.91</u>

*Underlined values indicate agreement level of .85 or greater.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER STUDY

This investigation studied two observational methods in order to determine which was more efficient. The observers who followed observational Method A collected classroom activity data on the entire class while those employing Method B obtained activity data on selected individuals in the same classroom during the same class period. Variations were compared both within and between the observational methods. The dimensions studied were: (1) the length of the observation interval, (2) the length of the observation period within a fixed class period, (3) the number of days of observation, and (4) the number of students observed.

Summary

The efficiency of observation Method A and Method B was determined by computing the Scott coefficients of agreement between each method and a criterion. Several variations of each method were examined and compared to a twenty-day cumulative criterion which was obtained by totaling the activity frequencies recorded every thirty seconds for thirty minutes for each of six categories. Various time intervals for recording observations within the thirty-minute observation period were investigated for both Method A and Method B and each interval was examined with respect to the number of days, pupils,

and observers required to reach a Scott coefficient of .85 or higher level of agreement.

Agreement between the twenty-day every thirty-second cumulative criterion and Method A, which required one observer in the classroom, was investigated employing the time intervals of two through fourteen minutes. A consistent .85 level of agreement was never reached with any of the recording intervals. However, when the two- and four-minute time intervals were utilized, there were no coefficients below .84 after the fifteenth day of recording. Also, the two-minute recording interval did not yield higher levels of agreement than the four-minute interval and recording intervals greater than four minutes could not be recommended as suitable observation intervals.

In order to determine the agreement of Method A with a criterion collected at the same time interval utilized by Method A, criterions were cumulated for thirty minutes for twenty days with time intervals corresponding to Method A. The results indicated there were several slight decreases in Scott coefficients with the two-minute time interval. However, when time intervals four through fourteen minutes were employed, there tended to be increases in the level of agreement of the coefficients. It was, therefore, concluded that when the criterion time interval corresponded to the Method A time interval, higher coefficients were obtained than with the every thirty-second twenty-day cumulative criterion.

When the comparisons of observation Method B and the twenty-day every thirty-second cumulative criterion were examined, it was found that if the activities of one pupil selected daily, were recorded by one observer for fourteen days either every 30 seconds, 1 or 2 minutes, a .85 or above level of agreement was produced. However, almost the

same consistent .85 or above level could be achieved in eight days by one observer recording the activities of five pupils either every 30 seconds, 1, 2, or 4 minutes. This would indicate that the four-minute time interval would be as efficient as the thirty-second interval when one observer recorded the activities of five pupils.

If two or three observers were available for the same classroom, only two days of recording the activities of sixteen pupils either every 30 seconds, 1, or 2 minutes would produce an almost consistent .85 or above level of agreement. Therefore, the two-minute time interval would be as efficient as the thirty-second or one-minute interval when at least sixteen pupils were observed for at least two days.

As the interval recording times were increased to six through fourteen minutes, the number of days and the number of students required to be observed in order to produce acceptable levels of agreement increased. It was noted, however, that two recordings made fourteen minutes apart on three daily randomly selected students did produce satisfactory levels on the fifteenth day and every day thereafter. This could be of importance if only one observer was available because visits could then be made to a number of classrooms for the purpose of recording activity data between recordings in a particular classroom. Hence, over a period of fifteen days data would be collected on the activities of several classrooms.

On the basis of the previous data which resulted from varying the time intervals of Method A and Method B, it was concluded that Method B was a more efficient method than Method A.

Another dimension that was investigated for Method B was the length of the daily observation period. All of the previous findings which have been discussed were based on a thirty-minute observation period. Therefore, 5, 10, 15 and 20 minute observation periods were

studied with a thirty-second time interval for recording activities. The data indicated that several more days of observing were required to produce acceptable levels of agreement with the five- and ten-minute observation periods than with a thirty-minute observation period when comparisons were made to the twenty-day cumulative criterion. Also, the fifteen and twenty-minute observation periods did not attain consistent levels of agreement of .85 or above until later than the thirty-minute observation period. However, if one observer would have observed five pupils every thirty seconds for fifteen or twenty minutes, almost consistent .85 or above levels of agreement would have been reached after eight days with only a few coefficients slightly below .85 after this point. When five students were observed for fifteen or twenty minutes each day for eleven days, there were even fewer low coefficients with none below .83. Also if three observers had recorded the activities of sixteen pupils for twenty minutes, almost consistent .85 or above levels of agreement would have been attained. Therefore, it was concluded that the every thirty-second twenty-minute observation period was as acceptable as the every thirty-second thirty-minute observation period. This would mean that perhaps two classes could be observed during the same class period rather than just one.

Next, the effects of varying the number of pupils observed continuously during a thirty-minute observation period were compared to the twenty-day every thirty-second cumulative criterion. The observation period was divided into sub-cycles which were equal in number to the number of students observed. This permitted one pupil to be observed continuously during one sub-cycle within the thirty-minute period.

Each of 15, 6, 3, or 2 pupils, depending upon the length of the sub-cycle employed, was observed at various intervals over a period of twenty days. This procedure required only one observer

in the classroom. Observing a different pupil every thirty seconds for two minutes resulted in a consistent .85 or above level of agreement after ten days of recording. As the recording interval increased to one or two minutes, the number of days required to reach an acceptable agreement level increased. When five continuous minutes were allotted to each of six pupils and the thirty-second, 1, 2, and 5 minute recording intervals were employed, the shortest number of days required to attain a consistent acceptable level of .85 or above was eight days and the utilization of the thirty-second time interval. As the number of pupils observed during the thirty-minute period was decreased to three, which permitted each pupil to be observed continuously for ten minutes, several indices of agreement were .85 or above with the thirty-second time interval from the fifth day on through the twentieth day, but a consistent .85 was not reached until the eighteenth day. When two pupils were continuously observed for fifteen minutes each and the 30-second, 1, 2, 5, and 15-minute recording intervals were employed, there was never a consistent .85 or higher level of agreement attained. Summarization of the results obtained from the sub-cycle continuous observations indicated that the thirty-second recording interval produced data requiring the least number of days to attain a .85 or higher level of agreement. Furthermore, when one observer recorded the activities of fifteen pupils, ten days were required to yield a .85 or higher, while eight days were required with six pupils, and eighteen days were needed with three pupils to attain a consistent .85 level of agreement.

The next investigation of observation Method B was concerned with intermittent sub-cycle observations. During each cycle, several students were observed by one observer with the same pupils included

in all sub-cycles within the thirty-minute observation period. All the combinations of sub-cycles were compared to the twenty-day every thirty-second cumulative criterion.

When five pupils were included in each sub-cycle, a greater number of days was required to yield a .85 or higher level of agreement than when there were ten or fifteen pupils in each cycle. With the thirty-second time interval, nine days were required to attain .85 or higher with ten or fifteen pupils in each sub-cycle while twelve days were required with five students in each cycle. Also, when the time interval was one minute, nineteen days were required to reach .85 or above with five pupil cycles while ten and fifteen pupil cycles required only approximately eight days to reach the same level of agreement. Therefore, it was concluded that the greater the number of students included in intermittent sub-cycle observations and the smaller the time interval for recording activities, the sooner the acceptable level of agreement is reached.

The last variation to be studied was the intermittent sub-cycle with different students in each sub-cycle. Each of these sub-cycles included five students. Only one observer would be required to record all pupil activities. The time intervals investigated were the thirty-second and the one-minute recording intervals. All observations were compared to the twenty-day every thirty-second cumulative criterion.

The data indicated that the every thirty-second recording interval revealed finer discriminations than the one-minute time interval. Eleven days were required to reach a consistent .85 or above with the thirty-second interval for thirty pupils, while nine days were needed for fifteen pupils and eight days for ten pupils. It should be noted that as the sub-cycle lengths increased, the number of pupils observed during a thirty-minute observation period had to be decreased.

When the one-minute time interval was utilized within sub-cycles, eight days of recording the activities of thirty pupils were required to reach a .85 or higher level of agreement and ten pupils required twelve days. The fifteen-pupil sub-cycles, however, never reached a consistent .85 level of agreement with the one-minute recording interval. When a five-pupil sub-cycle was employed, the every thirty-second time interval appeared to be the most efficient.

Conclusions

Several aspects of the analysis of the data included in this study indicate that observational Method B is a more efficient method than Method A. However, certain variations of Method B were more efficient than others. The decision that Method B was the better method was based on several factors.

The training period, which had to be considered as part of the total picture in evaluating both methods, was approximately the same for both methods. However, the coefficients of agreement among observers were usually much higher when the procedures for Method B were followed than when Method A was utilized.

Acceptable coefficients of agreement with the twenty-day every thirty-second cumulative criterion were attained much sooner and more consistently at the .85 level of agreement when the activities of selected individuals were recorded than when an observer recorded the activities of an entire class.

The decision as to which of the techniques of Method B is the most efficient to utilize in classroom observational studies can be based on the number of observer hours required in this study to reach an acceptable level of agreement of .85 or higher.

As comparisons were made to the twenty-day every thirty-second cumulative criterion, it was found that to obtain an almost consistent .85 or higher level of agreement, it was sufficient to observe sixteen pupils for two days every thirty seconds for twenty minutes. Only a few coefficients fell below .85 at any future point during the study and never lower than .82. Since the sixteen pupils would probably be scattered throughout the classroom, three observers would be required to record their activities. However, if the school operated on a fifty-minute class period basis, the observer hours could be cut in half by having the observers record the activities of two different classes during the same class period. Translating this into observer hours would mean three observer hours per class. However, only under these conditions would it be efficient to place three observers in the same classroom at the same time, and never would it be efficient to use four observers in the same classroom. The observer hours required for variations of Method B where either one or two classes are observed during a class period are listed in Table 36.

Examining the dimension interval change revealed that one observer would be required to record the activities of three pupils for eight days using either the 30 second, 1, or 2 minute interval for a daily thirty-minute period in order to attain a consistent .85 or above level of agreement. Therefore, eight observer hours per class would be required with these procedures. The data also indicated that fifteen or twenty minutes was a sufficient daily observation period after eleven days of observing if five pupils were observed every thirty seconds. This would mean that one observer could observe two classes during one class period and the observer hours per class would be reduced to five and one-half. Also, after the eleven-day period, information would be available on two classes rather than just one.

TABLE 36

OBSERVER HOURS REQUIRED FOR VARIATIONS OF METHOD B

Method B Interval	Observation Period	No. of Pupils Observed Daily	No. of Days	No. of Observers	No. of Classes Observed During Class Period	Observer Hours
30 sec	20 min	16	2	3	2	3
1 min	30 min	16	2	2	1	4
2 min	30 min	16	2	2	1	4
30 sec	15 min	5	11	1	2	5 1/2
30 sec	20 min	5	11	1	2	5 1/2
30 sec	20 min	16	2	3	1	6
30 sec	30 min	3	8	1	1	8
1 min	30 min	3	8	1	1	8
2 min	30 min	3	8	1	1	8
30 sec	15 min	5	11	1	1	11
30 sec	20 min	5	11	1	1	11

If two observers were available, the data indicated that they could be efficiently utilized by having them record the activities of sixteen pupils for thirty minutes for two days either every one minute or every two minutes. None of the coefficients computed after the two-day time period fell below . 80.

The sub-cycle techniques were designed to utilize one observer in the classroom. Generally speaking, the greater the number of students observed for each variation, the higher the resulting levels of agreement. When the continuous sub-cycle technique was employed, the least number of observer hours per class was eight. This occurred when six students were observed every thirty seconds for five minutes each over a period of eight days. Ten observer hours per class were necessary to reach a . 85 or higher level of agreement when fifteen pupils were observed every thirty seconds for two minutes each over a period of ten days. The observer hours required for variations of the sub-cycle techniques are shown in Table 37.

The intermittent sub-cycle techniques produced approximately the same results as the continuous sub-cycle technique. Nine observer hours per class were needed when the same ten or fifteen pupils were observed every thirty seconds in intermittent cycles. When the time interval was one minute, eight observer hours per class were utilized to observe the same ten pupils in three ten-minute sub-cycles. The daily observation period was thirty minutes. When five different pupils were observed intermittently in each sub-cycle, the least number of observer hours per class was eight. This occurred when five different pupils were observed every thirty seconds in one of two cycles lasting fifteen minutes each. Eight observer hours per class were also necessary to attain a . 85 or above level of agreement when five different pupils were observed every one minute in six five-

TABLE 37

OBSERVER HOURS REQUIRED FOR VARIATIONS OF THE SUB-CYCLE TECHNIQUES USING ONE OBSERVER

Sub-Cycle Technique	Observation Period	Interval Time	Length of Sub-Cycle	No. of Sub-Cycles	No. of Pupils in Sub-Cycle	No. of Pupils Observed Daily	No. of Days	Observer Hours
Continuous	30 min	30 sec	5 min	6	1	6	8	8
Intermittent	30 min	30 sec	15 min	2	5	10	8	8
Intermittent	30 min	1 min	10 min	3	10	10	8	8
Intermittent	30 min	1 min	5 min	6	5	30	8	8
Intermittent	30 min	30 sec	5 min	6	10	10	9	9
Intermittent	30 min	30 sec	7 1/2 min	4	15	15	9	9
Intermittent	30 min	30 sec	10 min	3	5	15	9	9
Continuous	30 min	30 sec	2 min	15	1	15	10	10

minute sub-cycles. Nine observer hours per class were required when activities were recorded every thirty seconds on five different pupils in three ten-minute sub-cycles.

Therefore, it can be concluded that if the class periods are approximately fifty minutes in length, the most efficient procedure to follow for Method B would be to have three observers record the activities of sixteen pupils every thirty seconds for twenty minutes in each of two classrooms during the same class period for two days. This procedure would require three observer hours per class. If only two observers are available, they can be most efficiently utilized by having them record for two days the activities of sixteen pupils every one or two minutes for thirty minutes. The total observer time per class would be four hours. When only one observer is available and the class periods are of sufficient length to permit two twenty-minute observation periods, the observer can be most efficiently utilized by having him record for eleven days in each of two classrooms during the same class period the activities of five pupils every thirty seconds for twenty minutes. The total observer hours per class would be five and one-half hours. However, if the class periods are only long enough to permit one observation period, the least number of observer hours required per class with one observer would be eight hours. This would be possible if the activities of three pupils were recorded every thirty seconds for thirty minutes over a period of eight days. It could also be accomplished by having the observer utilize one of the sub-cycle techniques to record the activities of pupils. It was found that eight observer hours were required when six students were observed continuously every thirty seconds for five minutes each for eight days or when the same ten pupils were intermittently observed every minute in each of three ten-minute sub-cycles for a period of eight days. Eight observer

hours were also required when five different pupils were intermittently observed every thirty seconds in one of two cycles lasting fifteen minutes or when five different pupils were intermittently observed every one minute in six five-minute sub-cycles.

The above findings can be contrasted to the Method A data. One observer recording class activities every two or four minutes for thirty minutes produced a consistent .84 or .85 level of agreement after fifteen days. Hence, at least fifteen observer hours would be necessary with Method A. Therefore, one observer was more efficiently utilized when observational Method B was followed rather than Method A.

In conclusion, Method B is to be recommended for obtaining classroom observations rather than Method A. Also, Method B is more efficient if the same students are followed each day for the entire observation period rather than utilizing the sub-cycle techniques. Furthermore, the total number of observer hours is less when two or three observers are utilized in the same classroom at the same time rather than one because the number of days required to reach a .85 level of agreement is considerably reduced.

Recommendations for Further Study

This study provided information which led to the conclusion that Method B is a more efficient observational method for observing pupil activities in an individualized classroom than Method A. It has also been determined that certain procedures for utilizing Method B are more efficient than others. However, the data which led to these conclusions were collected in an IPI mathematics classroom, which represents a specific type of individualized program. A replication

of this study could be conducted in another type of individualized setting in order to determine whether the same conclusions would be reached. Perhaps in another type of individualized classroom, the activities in which pupils engage may not be as diversified as those of the IPI program, and this might tend to reduce the number of observer hours per class required. Also, under other classroom conditions, specific conclusions regarding the time interval, the length of the observation period, and the number of days and students might be altered.

A further suggestion for replication would be to carry out this study in a conventional classroom. It would be expected that the .85 level of agreement would be attained very quickly with a criterion collected in a conventional-type classroom because the types of activities in which pupils engage are more limited than those in individualized programs.

All of the data for this study were collected in one fifth grade IPI mathematics classroom. Further research might be carried out in other fifth grade IPI mathematics classrooms and at different grade levels or within other subject areas. It is possible that there may be changes in observer hours required per class if this factor is dependent upon grade level or subject area or both.

Several time dimensions have been investigated in this research. However, one time dimension which was not investigated and which could be included in a future study is that of recording pupils' activities at various times during the school year. It could be hypothesized that as the school year progresses, the pupils become more independent and their activities become more diversified. If this were true, then the number of frequencies recorded in specific categories might increase or decrease and have an effect upon the length of time pupils must be observed to attain an acceptable level of agreement.

A further extension of this study might be to investigate the effect that altering the observation schedule might have upon observer efficiency. The observation schedule used in this research is shown in Appendix B. If the number of items under the categories is expanded or reduced, this might increase or decrease observer efficiency. Therefore, further research could examine the influence that utilizing only one, or a few, or various combinations of the categories would have on the observer hours required to attain an acceptable level of agreement and an adequate criterion.

Another suggestion for further research would be to compare the efficiency of Method B with other classroom activity type observational methods. For example, another method would be to have an observer watch selected individuals for a designated time interval, and at the end of the interval record his impression of what the pupil's activity was during that time. These recordings could then be compared to Method B observations.

If the above research suggestions could be incorporated into future studies, they would provide additional knowledge regarding the methodology of observational research. Through these types of investigations, more definitive information might be provided which could then be utilized in directing future research.

APPENDICES

APPENDIX A

THE SCOTT COEFFICIENT

In order to compare the observations obtained by Method A and Method B to the criterion measure, the Scott coefficient of agreement, π, was employed. Scott's procedure corrects the original proporations obtained for each category by taking into account the amount of agreement expected by chance. The formula used to compute π is as follows:

$$\pi = \frac{P_o - P_e}{1 - P_e}$$

where P_o is the observed proportion of agreement between the criterion and the specific method to be investigated and P_e is the proportion of agreement expected by chance. P_e is computed by the following formula:

$$P_e = \sum_{i=1}^{k} p_i^2$$

where k is the total number of categories and p_i is the proportion of frequencies falling into the i^{th} category. Since the categories are mutually exclusive, agreement on the basis of chance is obtained by summing the squared proportions falling into each category.

The frequency scores used in the computations are acquired by tabulating the frequency count of each item within each category. These scores are then converted to proportions and utilized in the Scott formula. As the data are cumulated, the frequency counts for the desired number of days can be summed and compared to either

the criterion for the same number of days or to the total criterion for twenty days. An example of the computations involved in determining the coefficient of agreement between the criterion and one day of activity observations obtained by Method A is shown by the following data:

Category No.	Criterion Frequency	Method A Frequency	Criterion p	Method A p	Difference	(Average p)^2
1	7,760	963	.6565	.6725	.0160	.4415
2	3,074	341	.2600	.2381	.0219	.0620
3	371	35	.0314	.0244	.0069	.0008
4	463	70	.0392	.0489	.0097	.0019
5	145	20	.0123	.0140	.0017	.0002
6	8	3	.0007	.0021	.0014	.0000
Totals	11,821	1,432	1.0000	1.0000	.0577	.5065

$$\frac{1.0000 - .0577 - .5065}{1.0000 - .5065} = .8830$$

APPENDIX B

THE RESULTS OF THE OBSERVER TRAINING PERIOD FOR THIS STUDY

Observational Methods A and B were investigated to determine the degree of observer agreement during the training period. At the same time during the first two days of classroom training, seven observers and the author recorded the activities of the same eight pupils every thirty seconds. The coefficients of agreement among observers for these two days are shown in the first two columns of Table A.

TABLE A

TRAINING PERIOD - SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY EACH OBSERVER UTILIZING METHOD B TO RECORD THE ACTIVITIES OF THE SAME EIGHT PUPILS EVERY THIRTY SECONDS AND THE POOL OF OBSERVATIONS RECORDED BY ALL OBSERVERS

	Day of Training and the Duration of the Observation Period in Minutes						
	1 29 min	2 34 min	3 45 min	4 47 min	5 40 min	6 50 min	7 44 min
Observer 1	.85	.94		.98		.80	.85
Observer 2	.93	.88		.95		.92	.94
Observer 3	.80	.70				.70	.80
Observer 4	.93	.88	.91		.90		.97
Observer 5	*	*	.98		.93		.95
Observer 6	.97	.86		.89		.83	.94
Observer 7	.90	.95	.88		.91		.84
Author	.94	.89	.85	.90			.96

*No coefficient computed because during a portion of the observation period, observer five recorded the activities of only four pupils rather than the activities of eight pupils.

On the third day in the classroom, four of the seven observers were assigned to follow the observational procedures of Method A while the other three observers continued to use Method B. On the following day, the fourth day, the four observers who during the previous session recorded activities using Method A were assigned to follow Method B while the other three observers employed Method A. This alternate assignment procedure was necessary because observers using Method A had to stand near the front of the classroom where the activities of all students could be viewed, and it would have been impractical and disruptive to the class for all observers to assume this position. On training days three and four, the author continued to follow observational Method B. The resulting coefficients among observers who employed Method A for days three and four are shown in the first two columns of Table B, while the coefficients which resulted among observers employing Method B in the same classroom for the same two days are shown in colums three and four of Table A. The assignments of the observers were then reversed again for classroom training days five and six. On these two days, the author recorded class activities by following the procedures of Method A. The coefficients of observer agreement for days five and six for Method A are presented in columns three and four of Table B, while the resulting coefficients for these same two days for observers who recorded the activities of eight students following Method B are shown in columns five and six of Table A.

TABLE B

TRAINING PERIOD - SCOTT COEFFICIENTS OF AGREEMENT BETWEEN OBSERVATIONS RECORDED BY EACH OBSERVER UTILIZING METHOD A EVERY TWO MINUTES AND THE POOL OF OBSERVATIONS RECORDED BY ALL OBSERVERS

Observer	Day of Training and the Duration of the Observation Period in Minutes			
	3 42 min	4 48 min	5 42 min	6 50 min
1	.80		.97	
2	.93		.95	
3	.91		.81	
4		.78		.67
5		.94		.85
6	.82		.92	
7		.74		.71
Author			.83	.91

The daily coefficients of agreement for observers who employed Method A during the actual twenty-day study are shown in Table 9 of Chapter IV. However, since it was not possible to obtain daily coefficients of agreement during the study for observers who followed Method B, coefficients of agreement for Method B were determined for all observers both before and after the study. This was done by having the observers record in the same classroom at the same time the activities of the same eight students every thirty seconds. The resulting coefficients obtained among observers before the study began are shown in the last column of Table A. These coefficients are also shown in column one of Table C and the after-study coefficients are presented in column two of Table C.

TABLE C

SCOTT COEFFICIENTS OF AGREEMENT AMONG OBSERVERS EMPLOYING METHOD B EVERY THIRTY SECONDS BEFORE AND AFTER THE TWENTY-DAY STUDY

		Before Study 8 students for 45 min	After Study 8 students for 40 min
Observer	1	.85	.96
	2	.94	.94
	3	.80	.88
	4	.97	.91
	5	.95	.90
	6	.94	.96
	7	.84	.97
	Author	.96	.91

Even though the before-study coefficients for two of the observers were slightly below .85 for Method B, it was decided to begin the study. This decision was based on the rationale that all recorders may not observe the same students at exactly the same second during the thirty-second recording interval. Therefore, the activities recorded for the same pupils may differ among observers because each observer records what he sees, and it may not be the same activity that another observer sees. Also, the degree of variety and frequency of activities may vary considerably on different days and the recordings may reflect these differences.

The after-study coefficients shown in the second column of Table C resulted from comparing each observer's recordings to the pool of observations recorded of the activities of the same eight pupils every thirty seconds for a period of forty minutes. These comparisons resulted in coefficients of observer agreement above .85.

AN INSTRUCTION MANUAL FOR OBSERVERS

The following is a daily detailed description of the training procedure for observers. Each day's training period is approximately one hour in length.

First Day

Purpose of the Research

The observing and recording of the variations of pupil activities is the primary concern of this research. In this study, two methods of observing pupil activities are to be utilized in the same classroom at the same time. One method requires the observer to record the activities of the entire class, while the other method requires the observing and recording of the activities of only a few selected individuals. The purpose of this research is to determine which of these two methods is more efficient for observing pupil activities. In order to confirm the decision, both methods will be compared to a criterion measure which will be a cumulative measure collected by recording the activities of each member of the class over an extended period of days. The detailed examinations of the two observation methods will include variations of the time interval, length of the observation period, the number of days, and the number of pupils observed. Each of the variations will be checked to determine the degree of agreement with the criterion.

Because of the decisions that are to be made as a result of this research, it is necessary that the recordings of pupil activities

made by the observers be accurate. Therefore, a training period is provided for observers. All observers are to be trained to follow both observational methods. Each day during the research study two observers will be chosen to record the activities of the entire class and four other observers will record the activities of assigned individuals.

Operational Procedures in an IPI Classroom

Before entering the classroom the observer should understand the basic structure of the IPI classroom. It should be pointed out that there are three types of participants in the classroom: (1) the pupil, (2) the teacher, and (3) the teacher aide. Each of these types has his own role and duties which keep the classroom operating and functioning. The pupil works with worksheets, tests, and other materials at his own pace, but his overall goal is toward academic progress. He has freedom of movement in the classroom so that he can procure and select any needed materials. If he requires assistance, he can either ask the teacher or another pupil. Thus, there is cooperation among students in carrying out various activities. The role of the teacher is generally that of a tutor and an overall coordinator. When the pupil has specific problems that require the assistance of the teacher, help is usually given on an individual basis by the teacher to the student. The teacher also directs and guides the student toward future progress. To assist the teacher with clerical duties, a teacher aide is provided. The aide scores worksheets and tests and might also perform other duties which the teacher requests, such as giving oral tests.

Notebook

Each of the observers is to be provided with a notebook which contains the following: (1) A list of the major categories, (2) A list with the major categories broken down into sub-categories, (3) A detailed listing of specific activity items which would be recorded under each of the subcategories, (4) An instruction manual for observers, (5) Two sample observation forms illustrating both methods of recording data, and (6) Several blank observation forms that can be used for practice.

Observation Categories

The main categories found on the observation form are as follows: (1) Independent - Involvement with Materials, (2) Independent - Non-Involvement with Materials, (3) Interaction - Peer Group - Two or more, (4) Interaction - Teacher-Student, (5) Interaction - Teacher Aide-Student, and (6) Teacher Directed Group Instruction - Two or more. After examination it will be noted that each of these categories represents the various types of interactions which the student has with materials, himself other pupils, the teacher, and the clerk. The sub-categories enable the observer to categorize overt pupil activities into each of the categories in an objective manner. Therefore, a minimum of observer interpretation is necessary. The following is a listing of specific activity items which would be recorded under each of the categories and sub-categories. It is recommended that a separate listing of the categories and the items under each be kept in the observer's notebook for ready reference.

The following are descriptions of the types of classroom activities that one would expect to occur in an IPI classroom.

I. Independent - Involvement with materials

Any classroom activity in which the pupil is independently involved with curriculum materials or equipment would be an independent - involvement with materials type of activity.

A. Using materials

1. The student is doing art work.
2. The student is using an audio-visual aid.
3. The student is working at the blackboard.
4. The student is taking a test.
5. The student is working on a worksheet.
6. The student is using a disc phonograph while working on a worksheet.
7. *The student is reading.*
8. The student is correcting his worksheet with an answer key.
9. The student is working on a teacher made drill.
10. The student is making corrections on a test after the clerk has corrected it.
11. The student is playing a game or working a puzzle.
12. The student is recording scores onto his prescription sheet.
13. The student is setting up mechanical equipment.

B. Selecting materials

1. The student is selecting a book from the bookshelf.
2. The student is selecting the correct answer key notebook.
3. The student is selecting a record.
4. The student is selecting the corresponding kit to his worksheet.
5. The student is selecting a math aid.

II. Independent - Non-involvement with materials

A pupil activity which does not involve another person, curriculum materials or equipment is an independent - non-involvement with materials type of activity.

A. Preparing for work

1. The student is organizing his papers or books.
2. The student is sharpening his pencil.
3. The student is getting materials from his desk.

B. Sitting with no involvement of people or materials

1. The pupil is staring out the window.
2. The student is not using the materials on his desk and he is not displaying signs that he needs help.
3. The student is staring into space.
4. The student is sitting in his seat but he is looking around the room.

C. Standing or moving about the room

1. The student is aimlessly moving about the room.
2. The student is standing in the corner for disciplinary reasons.
3. The student is leaving his seat.

D. Out of the room

1. The student is out of the room.

E. Waiting for help

1. The student is doing nothing at his seat but he has his hand up or his help flag displayed.
2. The student is waiting in line to see the teacher.

III. Interaction - Peer Group - two or more pupils

All activities in which the pupil becomes involved with one or more of his peers for social or instructional purposes are interaction - peer group activities.

A. Using Materials - at least one pupil

1. The student is engaging in art work with another pupil.
2. The student is part of a group working on a worksheet.
3. The student is part of a small group listening to a record.
4. The student is playing a game with another student.
5. The student is part of a group who are taking turns reading aloud.
6. The student is watching another student work a problem.

B. Receiving or giving help selecting materials

1. The student is helping another student to select a book.
2. The student is receiving help from another student in finding a test.

C. Watching, talking or listening with no involvement of materials

1. The student is talking to another student about his progress.
2. The student is playing a verbal game with another student.
3. The pupil is part of a group who are involved in discussion.
4. The student is talking to another student about a game.

D. Pushing, tapping, hitting

1. The student is tapping another student on the shoulder.
2. The student is striking another student.
3. The student is pushing another student.
4. The student is pulling another student's hair.

IV. Interaction - Teacher-Student

All pupil activities which require involvement between the teacher and pupil or require the assistance of the teacher are interaction - teacher-student activities.

A. Watching, talking or listening - material involvement

1. The student is asking the teacher a question about a test.
2. The student is taking an oral test from the teacher.
3. The student is watching the teacher work a problem.
4. The student is listening to instructions.
5. The student is receiving help on a worksheet.
6. The student is reading aloud to the teacher.
7. The pupil and the teacher are talking about a puzzle.

B. Waiting for materials or prescription - teacher involvement

1. The student is waiting while the teacher writes out a prescription.
2. The student is waiting while the teacher writes out a drill.
3. The pupil is waiting while the teacher gets a special book.

C. Talking or listening to - no material involvement

1. The student is being verbally disciplined.
2. The student is getting instructions about where to find a book.
3. The pupil and the teacher are talking.

V. Interaction - Teacher Aide-Student

All pupil activities involving the teacher aide or related to pupil involvement with the teacher aide are considered interaction - teacher aide-student activities.

A. Waiting at aide's desk

1. The student is standing at the clerk's desk.
2. The student is waiting at the aide's desk for the aide to grade his paper.
3. The student is standing in line at the clerk's desk.
4. The student is waiting for the aide to find him materials.

B. Listening or talking to

1. The student and the aide are talking.
2. The student is verbally checking his work with the clerk.

VI. Teacher directed group instruction - two or more students

All classroom activities involving the teacher and two or more students or the entire class are classified teacher directed group instruction activities.

A. Listening or watching

1. The pupil is part of a group receiving instructions from the teacher.
2. The pupil is part of a group to whom the teacher is lecturing.
3. The pupil is part of a class engaging in teacher directed discussion.
4. The pupil and another pupil are being verbally disciplined by the teacher.

B. Talking

1. The pupil is asking a question during group discussion.
2. The pupil gives a recitation.

C. Using materials - teacher or pupil

1. The student is watching a movie with the class.
2. The pupil is taking a group test being given by the teacher.
3. The pupil is playing a game directed by the teacher.
4. The pupil and another student are receiving help from the teacher in solving a puzzle.
5. The entire class is listening to a record.
6. The pupil and another student are receiving help on a worksheet.
7. The pupil is reading aloud to the class.

Observation Form

To increase the speed of recording and to improve the accuracy of the recording of activities, the observation form has been coded according to the following color scheme: (1) Independent - Involvement with Materials - Red, (2) Independent - Non-Involvement with Materials - Blue, (3) Interaction - Peer Group - Yellow, (4) Interaction - Teacher-Student - Green, (5) Interaction - Teacher Aide-Student - Orange, and (6) Teacher Directed Group Instruction - Brown. Each of the corresponding colors should be drawn through the major category headings and every other sub-category on the observation form. Following this procedure facilitates locating the proper sub-category quickly.

It should be noted that there are two types of observation forms. They differ with respect to the beginning time intervals provided and the size of the space for recording. The observation form which is to be used for recording the activities of the entire class has beginning times listed from 0 through 28. This form allows recordings to be made at the beginning of every two minutes for a period of thirty minutes. At the beginning of each time interval a tally is recorded for each member of the class opposite the activity in which each member is engaging. The number of tallies should equal the number of pupils in the class. Space has also been provided for the observer to record the date and his name.

To record the activities of individuals use the observational form which lists beginning time intervals from 0 to 14. This form enables the observer to record the activities of individuals for a total of fifteen class minutes at the beginning of every thirty seconds. The observer records his name, the date, and the names of the pupils who are to be observed. The number opposite the pupil's name then becomes the number recorded in each column opposite the activity in which the

pupil engages. This system allows the activities of several pupils to be recorded in the same column at the same time. For example, a one is recorded opposite the activity in which the first pupil is engaging while two is recorded opposite the activity in which the second pupil is engaging. At times it is not always possible to obtain the pupil's name at the beginning of the recording session so some item of clothing or personal characteristic might be noted to facilitate following the activities of the pupil and the name can be obtained later.

Item Cards

These cards are designed to assist in training the observer to categorize pupil activities in the proper category and to record activities quickly once they have been mentally categorized. With these cards the observer can practice categorizing and recording classroom activities at home. On one side of each card is a statement representing an activity in which a pupil might engage and on the opposite side of the card in color code is the category and sub-category under which the activity should be recorded. The observer places a tally on the observation form opposite the proper sub-category.

Second Day

Drill

The activity items on the item cards are to be quickly read to the observers as they attempt to classify and record the statements by marking a tally opposite the proper sub-category on the observation form. Accuracy can then be checked by counting the tallies placed opposite each sub-category.

Discussion

Any further clarification that is necessary should be discussed so that misunderstandings can be corrected.

TV Tape

To aid in training the observers to identify and record pupil activities, a TV tape recorded in an IPI math class is to be shown. Approximately five minutes of the tape will be shown as the activities of the pupils are pointed out to the observers. Then the tape will be backed up and re-run. The observers will be instructed to record the activities of the same two pupils every thirty seconds for approximately five minutes. While the tape is running, the activities of the pupils will be discussed by the instructor and the observers. This type of discussion will assure proper classification. After the first five minutes, the observers will be instructed to record the activities of the same four pupils every thirty seconds. Discussion of the film will continue to take place while the observers are recording. After approximately ten minutes of recording the activities of four pupils, the observers will be instructed to record the activities of the same six pupils and after a few minutes the activities of the same eight pupils. Each observer will be given a stopwatch at the beginning of the recording session so that experience can be gained recording within the allotted time intervals.

To gain experience recording the activities of an entire class, approximately ten or fifteen minutes of the TV tape will be run while the observers record a tally opposite the activity in which each pupil is engaging. The activities of the class will be recorded every two minutes. While the observers are recording, discussion of the activities will also be taking place. The instructor will also point out on the screen the various activities taking place.

Third Day

Drill

Once again the statements on the item cards will be quickly read to the observers while they classify and record the activities. The tallies will be added and checked to determine the accuracy of the observers.

Discussion

Any questions that the observers have will be answered and any other clarifications that may be necessary will be discussed.

TV Tape

The training of the observers will be continued with the aid of the TV tape used previously. The film will be advanced for approximately two minutes while the observers record the activities of the same two pupils. For the next four minutes the observers will record the activities of the same four pupils and during the next four minutes the activities of the same six pupils. Finally, for the next fifteen minutes the observers will record the activities of the same eight pupils every thirty seconds. The instructor will point out the activities on the screen while the tape is running and also any discussion that is necessary will take place.

After recording the activities of individual students, the activities of the entire class will be recorded for approximately twenty minutes every two minutes. Discussion will also take place during this showing.

Fourth Day

Before entering the classroom, the observers will be instructed to record the activities of the same two pupils for approximately ten minutes every thirty seconds. Then the activities of the same four

pupils will be recorded for approximately fifteen minutes every thirty seconds. During the remaining class time the observers will record the activities of the same six pupils every thirty seconds.

Any questions which the observers might have will be answered after the class period has ended.

The observers' observation forms will be collected and checked by the instructor.

Fifth Day

Further clarification of recording data and categorizing activities will be discussed. The previous day's recording results will determine the topics for discussion. Any questions the observers have will also be answered.

The observers will be instructed to record the activities of the same four pupils for approximately ten minutes every thirty seconds and to increase the number of pupils to six for approximately ten minutes of recording. During the remaining class time the same eight pupils will be observed and their activities noted every thirty seconds.

If the observers have questions about the day's recording session, they will be answered after the class is over.

The observational forms will be collected and checked for observer agreement.

Sixth Day

All observers will enter the same classroom at the same time. Three of the observers being trained will be assigned to observe and record every two minutes the activities of the entire class. This is done by marking tallies opposite the sub-categories representing the activities in which the members of the class are engaging. The remaining four

observers will be instructed to observe and record at the beginning of every thirty seconds the activities of the same eight students. Each pupil to be observed is assigned a number and then this number is recorded opposite the appropriate sub-category indicating the pupil's activity.

Questions concerning the recording of the activity data will be answered at the end of the recording period.

All observation forms will be collected and checked for observer agreement.

Seventh Day

All observers will enter the same classroom at the same time. Those observers who recorded the activities of the entire class during the last training session will be instructed to record the activities of the same eight pupils every thirty seconds during this session. The other observers who recorded the activities of individuals during the previous session will be assigned to record the activities of the entire class every two minutes during this training period.

Questions will be answered at the end of the session.

The observation forms will be collected and checked for observer agreement.

Eighth Day

The observers will enter the same classroom at the same time. For this session the observers will again be reassigned. Those observers who recorded the activities of individuals during the previous recording period will now have another practice session recording the activities of the entire class every two minutes. The remaining observers will have a second practice session at recording the activities of the same eight pupils every thirty seconds.

At the end of the recording session questions will be answered.

All observation forms will be collected and checked for agreement.

Ninth Day

All observers will enter the same classroom at the same time. Once again the observers will be reassigned. At the end of this session each of the observers should have had two practice sessions at recording eight individuals every thirty seconds and two practice sessions at recording the activities of the entire class every two minutes.

Any necessary discussion will take place after the recording period.

Observation forms will be collected and checked for agreement.

Tenth Day

The agreement among observers should reach approximately a Scott coefficient of .85. If the agreement among observers who were recording the same eight pupils appears to be too low after only two practice sessions, each observer will be given another practice session following each of the two observational methods. Those observers who followed the activities of individuals during the previous session will be assigned to record the activities of the entire class every two minutes while the other observers record the activities of the same eight individuals every thirty seconds.

Any questions that the observers have will be answered at the end of the recording session.

All observation forms will be collected and checked for agreement.

Eleventh Day

Observers will be assigned so that at the end of this recording period all observers will have had three practice sessions recording the activities of the entire class every two minutes and three sessions recording the activities of the same eight individuals every thirty seconds.

Any necessary discussion will take place at the end of the recording period.

All observation forms will be collected and checked for agreement.

Twelfth Day

All observers will enter the same classroom at the same time. During this session all observers will be instructed to record the activities of the same eight individuals every thirty seconds.

If the recordings of each of the observers for the twelfth day are satisfactory, the research study data collection will begin on the thirteenth day. Satisfactory agreement would be a Scott coefficient of approximately .85.

STUDENT OBSERVATIONAL FORM
INDIVIDUALLY PRESCRIBED INSTRUCTION
METHOD A

Observation Categories

Time Begin	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28
INDEPENDENT - INVOLVEMENT WITH MATERIALS															
A. Using materials															
B. Selecting materials															
INDEPENDENT - NON-INVOLVEMENT WITH MATERIALS															
A. Preparing for work															
B. Sitting with no involmnt of people or mtrls															
C. Standing or moving about room															
D. Out of room															
E. Waiting for help															
INTERACTION PEER GROUP - TWO OR MORE															
A. Using materials - at least one pupil															
B. Receiving or giving help selecting mtrls															
C. Watching, talking, listening -no mtrl invol															
D. Pushing, tapping, hitting															
INTERACTION TEACHER-STUDENT															
A. Watching, talking, listening - mtrl invol															
B. Waiting for mtrls or prscriptn -teahcer invol															
C. Talking or listening - no mtrl involmnt															
INTERACTION - TEACHER AIDE-STUDENT															
A. Waiting at aide's desk															
B. Listening or talking to															
TEACHER DIRECTED GROUP INSTRCTN - TWO OR MORE															
A. Listening or watching															
B. Talking															
C. Using materials - teacher or pupil															
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28

STUDENT OBSERVATIONAL FORM
INDIVIDUALLY PRESCRIBED INSTRUCTION
METHOD B

Date _____

Observer _____

Pupils

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Time Begin	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
INDEPENDENT-INVOLVEMENT WITH MATERIALS															
A. Using materials															
B. Selecting materials															
INDEPENDENT-NON-INVOLVEMENT WITH MTRLS															
A. Preparing for work															
B. Sitting with no involmnt peo or mtrls															
C. Standing or moving about room															
D. Out of room															
E. Waiting for help															
INTERACTION - PEER GROUP - TWO OR MORE															
A. Using materials- at least one pupil															
B. Recvng or gvng help selecting mtrls															
C. Watchg, talkg, listng - no mtrl invol															
D. Pushing, tapping, hitting															
INTERACTION - TEACHER-STUDENT															
A. Watchg, talkg, listng - mtrl invol															
B. Waitg for mtrls or prscriptn-tchr invol															
C. Talking or Listening- no mtrl invol															
INTERACTION - TEACHER AIDE-STUDENT															
A. Waiting at aide's desk															
B. Listening or talking to															
TEACHER DIRECTED GROUP INSTRCTN-TWO OR MOR															
A. Listening or watching															
B. Talking															
C. Using materials - teacher or pupil															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

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